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THE DELETION OF *CAREX STIPATA* (CYPERACEAE) FROM THE TEXAS FLORA

¹Stanley D. Jones, ²Gretchen D. Jones, & ¹ Stephan L. Hatch

¹S.M. Tracy Herbarium, Department of Rangeland Ecology and Management, Texas A&M University, College Station, Texas 79843 U.S.A

²Department of Biology, Texas A&M University, College Station, Texas 79843 U.S.A

ABSTRACT

There are two species of *Carex*, subgenus *Vignea*, section *Vulpinae* Kunth in Texas, *Carex crus-corvi* Shuttlw. ex Kunze and *Carex oklahomensis* Mackenzie. *Carex stipata* Muhl. ex Willd. was found not to occur in Texas. *Carex crus-corvi* has the widest distribution in Texas, being found in the eastern one-half of the state ranging westward to Brown County, southward to Nueces County, and northwestward to Wichita County. *Carex oklahomensis* has only been documented in the northeastern part of the state in Camp, Cherokee, Nacogdoches, Smith, Titus, and Wood counties.

KEY WORDS: *Carex*, *Carex crus-corvi*, *Carex oklahomensis*, *Carex stipata*, section *Vulpinae*, Cyperaceae, Texas

Subgenus *Vignea*, section *Vulpinae* are species of swampy sites. Eleven are widely distributed in North America with only two in Texas. Four are found in southern Africa and the highlands of eastern Africa, one in Europe and western Asia extending into northern Africa, and one in southern Australia (Mackenzie 1931).

Characteristics of this section are: stigmas 2; achenes lenticular (2 sided); spikes androgynous or pistillate, but never gynaecandrous; lateral spikes sessile; sheaths usually either transversely rugose or dotted with erythrocyanins ventrally; perigynia planoconvex, appressed-ascending, stipitate, conspicuously many nerved dorsally, strongly to nerveless ventrally, conspicuously beaked; beak usually serrate and bidentate.

Cory & Parks (1937) listed *Carex crus-corvi* Shuttlw., *C. oklahomensis* Mackenzie, and *C. stipata* Muhl. var. *maxima* Chapm. as occurring in Texas.

Correll & Johnston (1970) listed *C. crus-corvi* Kunze and *C. stipata* Muhl. as occurring in Texas. In their species description of *C. stipata* they included var. *maxima* Chapm. They stated "*C. stipata* and *C. muhlenbergii* Schkuhr ex Willd. (especially the form '*C. lunelliana*') have apparently hybridized in the past; some of the products have been called *C. oklahomensis* or *C. stipata* var. *oklahomensis* (Mackenzie) Gleason." Gould (1975) listed *C. crus-corvi* Shuttlw., *C. oklahomensis* Mackenzie, and *C. stipata* Muhl. var. *maxima* Chapm. as occurring in Texas. Hatch, *et al.* (1990) listed *C. crus-corvi* Kunze and *C. stipata* Muhl. ex Willd. var. *stipata* as occurring in Texas.

Cory & Parks (1937) and Gould (1975) acknowledged *C. oklahomensis* as being in our flora whereas Hatch, *et al.* (1990) did not. Correll & Johnston (1970) acknowledged its occurrence in our flora but opted not to recognize this taxon at any taxonomic level. There was complete agreement amongst these authors that *C. crus-corvi* and *C. stipata* occurred in our flora.

Herbarium studies provided insights to which taxa occur in Texas and to their distinctness. Field studies provided habitat information about these taxa and defined their distributional ranges in Texas. Literature review helped define species, since we were unsuccessful at locating type specimens, define previously reported distributional ranges, and resolve the problem of author citation.

METHODS AND PROCEDURES

This report was based on field studies and herbarium specimens. Herbarium specimens were examined from the following herbaria: (acronyms follow Holmgren, *et al.* 1981) ASTC, MO, NA, NLU, SHST, SMU, SWT, TAES, TAMU, TEX, and US. Texas specimens of *Carex crus-corvi*, *C. oklahomensis*, and *C. stipata* were requested for study. We received no specimens labeled *C. oklahomensis*, about 25 specimens labeled *C. stipata*, and approximately 300 specimens labeled *C. crus-corvi*. Field trips to east, southeast, northeast, and central Texas were conducted from 1988 to 1990 to supplement distribution and habitat records.

RESULTS AND DISCUSSION

All specimens labeled *Carex crus-corvi* were found to be identified correctly. Most specimens labeled *C. stipata* were found to be *C. crus-corvi*. A few specimens identified as *C. stipata* were *C. oklahomensis*. *Carex oklahomensis* was found to be a distinct taxon. *Carex stipata* var. *stipata* and *C. stipata* var. *maxima* were not represented in the Texas specimens examined. It is still possible that *C. stipata* occurs in Texas, however, we found no vouchers of this species from Texas nor have we found it in the field. Without a verified specimen of this taxon we suggest it be deleted from the species lists of our flora.

Carex oklahomensis and *C. crus-corvi* are heliophytes. They are most frequently found growing in full sun. However, on occasion, they can be found growing in partial shade. Both were always growing in shallow standing water or in wet ground that was previously covered with water.

The following key will separate *Carex crus-corvi*, *C. oklahomensis*, and *C. stipata* (including var. *stipata* and var. *maxima*). Mature specimens should be used in making determinations. *Carex stipata* is included in this key although it is not found in Texas. The correct authority for *C. crus-corvi* is Shuttlw. ex Kunze and for *C. stipata* Muhl. ex Willd.

KEY TO SECTION *VULPINAE* OF TEXAS INCLUDING *CAREX STIPATA*

1. Ventral leaf sheath margins with orange-red dots; achenes ovate-lanceolate; perigenial wall adhering to achene. *C. crus-corvi*
- 1' Ventral leaf sheath margins without orange-red dots; achenes broadly ovate; perigenial wall little to not at all adhering to achene.
2. Dorsal leaf sheath dark blue-green with conspicuous white dots without conspicuous septate nodules; ventral leaf sheath not transversely rugulose. *C. oklahomensis*
- 2' Dorsal leaf sheath beige to light stramineous or light olive with conspicuous green septate nodules; ventral leaf sheath transversely rugulose. *C. stipata*

ACKNOWLEDGMENTS

We thank the curators and staff of all herbaria from which loans were borrowed. We thank Charles T. Bryson (USDA, SWSL), David Castaner (WARM), and J.K. Wipff (TAES) for reviewing this manuscript. This is Technical Bulletin TA 28045, Texas Agricultural Experiment Station.

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STUDIES IN *STYLEDIUM* FROM WESTERN AUSTRALIA: NEW TAXA; REDISCOVERIES AND RANGE EXTENSIONS

Allen Lowrie¹ & Sherwin Carlquist²

¹6 Glenn Place, Duncraig, Western Australia 6023, AUSTRALIA
²Rancho Santa Ana Botanic Garden & Department of Biology, Pomona College, Claremont, California 91711 U.S.A.

ABSTRACT

Seven new species and two new subspecies of *Styliidium* from Western Australia are described and compared to their nearest relatives. These are known only from the type localities except for *S. albolilacinum spec. nov.* Localities are given for recent collections of species not collected to any appreciable extent since their type collections; these reports inevitably involve range extensions. *Styliidium exoglossum* Erickson & Willis proves to be a synonym of *S. pygmaeum* R. Br.

KEY WORDS: *Styliidium*, Styliidiaceae, taxonomy, Australia

NEW SPECIES AND SUBSPECIES

As with our earlier paper (Carlquist & Lowrie 1989), we are presenting Latin diagnoses in the style of Mildbraed (1907). The new species are presented first, then the subspecies. The species are presented in alphabetical order rather than organized in terms of currently recognized sections. As the family becomes better known, at least some of the currently recognized sections are likely to be modified. Because the new species are compared to currently known species judged to be most closely related to them, the new species may be easily placed in the sections recognized by Mildbraed (1907).

***Styliidium albolilacinum* A. Lowrie & S. Carlquist, *stat. nov.* BASIONYM:**
Styliidium diuroides Lindl. var. *albolilacinum* Erickson & Willis, Victorian Nat. 83:110-111. 1966.

Herba perennis, caudice semi caulescente. Folia radicalia filiformis, dense glandulosa obtusiuscula, 1.5-3.5 cm, plerumque 2.5 cm longa. Scapi 20-38 cm, plerumque 30 cm alti, glandulosopubescenti, verticilli 2, foliorum radicalibus simili sed microrum. Racemi laxi et satis elongati, bracteae ut prophyliae anguste lineares. Calycis sparse glandulosis. Calyx lobes lineares subacute quam tubus longiores. Corollae tubus brevis, laciniae ovato-oblongae, albae, extus albae et violaceae. Appendices faucis oblongae 6, apice manifeste breviter pubescentes, labellum ovato-lanceolatum, exappendiculatum, arcuatum. Capsula ovoidea, 3 mm longa.

Perennial herb, forming perceptible stems at base. Leaves of the rosette linear, densely glandular and minutely obtuse, 1.5 to 3.5 cm long, mostly about 2.5 cm long. Inflorescences 20-38 cm, mostly about 30 cm tall, glandular pubescent, lax and rather elongate, verticils of bracts 2, bracts like the rosette leaves but smaller. Calyx tube (ovary) sparsely glandular. Calyx lobes linear, subacute, a little shorter than the calyx tube. Corolla tube short, corolla lobes ovate-oblong, white to violet on outer surfaces. Throat appendages 6, oblong, with tips perceptibly short-pubescent. Labellum ovate-lanceolate, without appendages, arcuate to one side. Capsule ovoid, 3 mm long.

Stylium albolicinum (Fig. 1) is recognized here at the specific level; it was described as *S. diuroides* Lindl. var. *albo-lilacinum* by Erickson & Willis (1966). That it is genetically separated from *S. diuroides* is suggested by the occurrence of nearby populations of the two: at one locality (Great Northern Highway, 2 km northeast of Wandena Road [North End], Muchea, Western Australia, October 7, 1989, Allen Lowrie 241: PERTH, RSA), *S. albolicinum* was found in white sand only 10 meters away from a laterite rise on which *S. diuroides* subsp. *diuroides* was growing. In addition to the difference in soil preference, *S. albolicinum* differs from *S. diuroides* by having shorter leaves that are more densely glandular; slightly taller racemes; and corolla color (lobes white and pale violet outside with faint purple lines).

***Stylium carlquistii* A. Lowrie, spec. nov.** HOLOTYPE: In a laterite and sand soil on margins of a gravel mine, ca. 4 km east of the Brand Highway, the first gravel pit on the south side of Wannamal West Road, about 22 km north of Gingin, Western Australia, 5 October 1990, Allen Lowrie 104 (PERTH). Isotype: RSA.

Perennis caudice caespitoso, vel suffrutex, 8-20 cm altus, erectus. Folia dense rosulata vel sparsa, linearia, 1.5-2.5 cm plerumque 2 cm longa, 1-2 mm lata, apice semper acuta, infra carinata, recta vel arcuata, non mucronata, glabra, marginibus subrecurvis vel subtus bisulculata, glabra, nonglaucosa. Folia stolonis breviora. Scapi 20-35 cm alti, glandulosopubescentes, verticilli paucibracteati

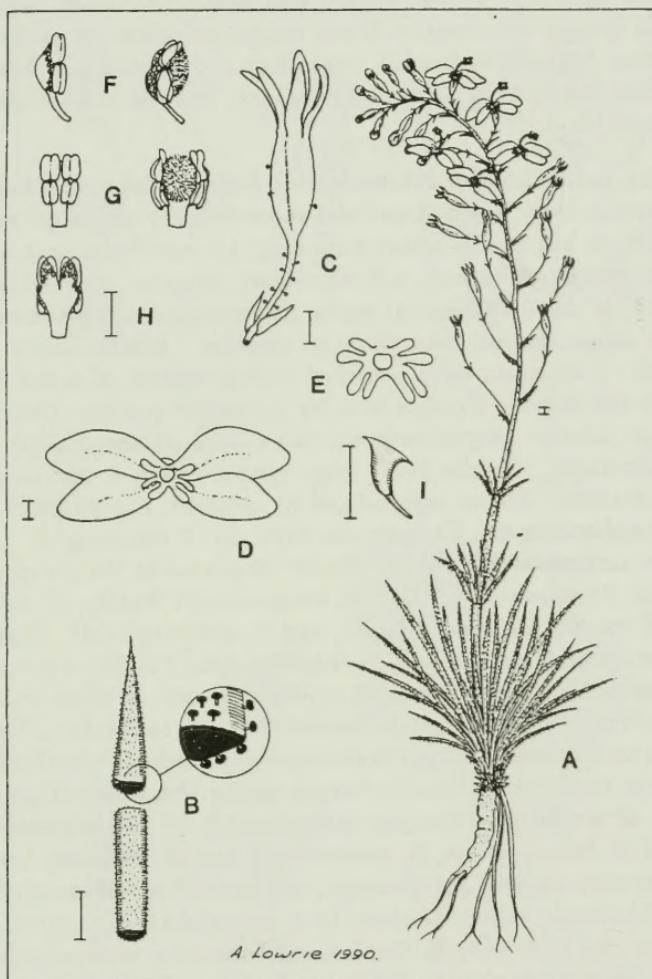


Figure 1. *Stylium albolilacinum*. A. Habit of plant. B. Leaf, with enlarged portion. C. Pedicel, ovary, and calyx lobes. D. Face view of corolla. E. Throat of corolla, enlarged, to show appendages. F. Lateral view of column tip (with stigma grown out, right). G. Face view of column tip (with stigma grown out, right). H. Back of column tip. I. Labellum. Scale = 1 mm.

instructi, bracteae lineares, patentes. Flores in paniculam laxam anguste pyramidalam dispositi. Calycis glanduloso-pubescentis, 1.5 mm longi, lobi obtusi, 2.5-3.0 mm longi, glandulosi. Corolla roseam laciniae subaequales, 8 mm longae, ellipticae vel obovatae, crenatae. Appendices faucis 6, aequales, apice capitulatum flavum. Labellum lanceolatum, longe acuminatum. Capsula ovoidea-globo-sa, 3 mm longa.

Caespitose perennial or a subshrub from 8-20 cm tall (excluding inflorescence). Leaves densely rosetted but also more sparsely scattered on elongate stems, 1.5-3.5 cm but mostly about 2 cm long, 1-2 mm wide, apex acute, carinate below, straight or arcuate, not mucronate, margins recurved (lower side two furrowed) in dried specimens, leaves glabrous and not glaucous. Leaves on elongate stems shorter than those in rosettes. Inflorescences 20-35 cm tall, glandular pubescent, each provided with a verticil of a few spreading bracts below the flowers. Flowers in a lax pyramidal panicle. Ovary glandular pubescent, 1.5 mm long at anthesis, calyx lobes obtuse, 2.5-3.0 mm long, glandular pubescent. Corolla pink, lobes almost equal, 8 mm long, elliptic to obovate, crenate. Throat appendages 6, capitate, tips yellow. Labellum lanceolate, long acuminate. Capsule ovoid-globose, 3 mm long.

Stylium carlquistii (Fig. 2) can readily be placed in the group of species that includes *S. amoenum* R. Br., *S. brunonianum* Benth., *S. lowrieana* Carlquist, *S. maitlandianum* E. Pritz, and *S. striatum* Lindl. These species have one or more verticils of bracts on the inflorescence and rose-purple flowers with six prominent capitate throat appendages as well as other features that ally species of this group. Within the species group, *S. carlquistii* differs from *S. amoenum* by its distinctive narrow leaves and its branched stems that produce a suffrutescent habit. This habit is unique within the group of species cited above, none of which have elongate stems except for *S. carlquistii*. Unlike the leaves of *S. brunonianum*, *S. lowrieana*, and *S. striatum*, leaves of *S. carlquistii* are very narrow, not glaucous, and have recurved margins in dried specimens. The single verticil of bracts in *S. carlquistii* is distinctive; a second may occur at the first node in the inflorescence in a few specimens. The inflorescence of *S. carlquistii* is distinctive in being branched and therefore paniculate, whereas the other species of the group have simple racemes.

***Stylium coatesianum* A. Lowrie & S. Carlquist, spec. nov. HOLOTYPE:**

In laterite soil on top of mesa east of the old homestead in the Tutanning Reserve east of Pingelly, Western Australia, 7 November 1989, Allen Lowrie 242. Isotype: RSA.

Perennis caudice caespitoso. Folia radicalia rosulata supra subtusque dense et breviter nonglanduloso-pubescentia, oblanceolato-lineata, incurvata, coriacea, 1.0-3.5 cm plerumque 3 cm longa,

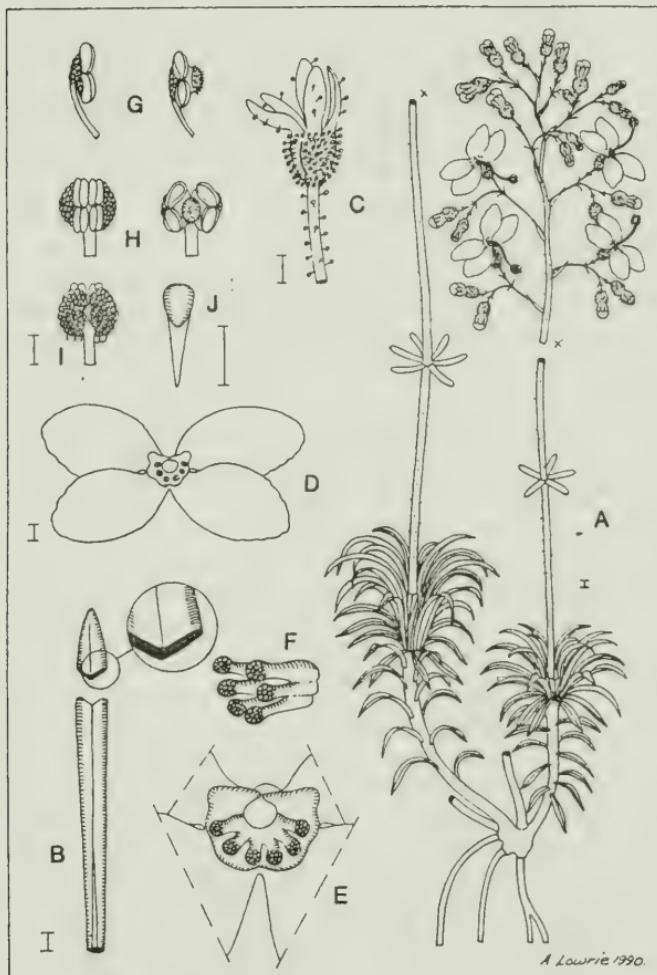


Figure 2. *Stylium carlquistii*. A. Habit of plant. B. Leaf, with enlarged portion. C. Pedicel, ovary, and calyx lobes. D. Face view of corolla. E. Throat of corolla. F. Throat appendages, enlarged. G. Lateral view of column tip (with stigma grown out, right). H. Face view of column tip (with stigma grown out, right). I. Back of column tip. J. Labellum. Scale = 1 mm.

2 mm lata. Scapi parte inferiore glabra, parte superiore sparse glanduloso-pubescentes, flores in racemum dispositi. Pedicelli breve glanduloso-pubescentes, bracteae scarioso-marginatae. Calycis glaberrimi, tubus ovatus, 2.5 mm longus, lobis obtusis, scarioso-marginatis, subaequilongus. Corollae flavae, laciniae oblongae, rotundatae, 3.0-3.5 mm longae; faucis appendices 4 laciniatae, brunneocapitatae et 3 rotundatae, nitidae. Labellum lanceolatum, curvatum. Capsula et semina ignota.

Caespitose perennial. Leaves in a basal rosette, covered densely with nonglandular hairs on both surfaces, oblanceolate-linear, margins incurved, texture coriaceous, 1.0-3.5 cm and mostly 3 cm long, 2 mm wide. Inflorescences glabrous below, upper portions sparsely glandular pubescent, flowers in a raceme. Pedicels with short glandular hairs, bracts with scarious margins. Ovary glabrous, ovate, 2.5 mm long, calyx lobes obovate, obtuse, scarious margined, about as long as the ovary or a little shorter. Corollas yellow, corolla lobes oblong, tips rounded, lobes 3.0-3.5 mm long. Throat appendages 4, lacinate, with brown capitate tips, alternating with an additional 3 throat appendages which are rounded and shining. Labellum lanceolate and curved to one side. Capsule and seeds unknown.

Stylium coatesianum (Fig. 3) can be referred to what has been called "the *S. spathulatum* R. Br. complex" (Carlquist 1966). This complex includes, in addition to typical *S. spathulatum*, *S. spathulatum* subsp. *acuminatum* Carlquist, *S. spathulatum* subsp. *glandulosum* (Mildbraed) Carlquist and *S. lineatum* Sond. In addition to these latter two subspecies, we can recognize *S. coatesianum* and the species described below, *S. cymiferum*, at the specific level because these two species have a series of distinctive morphological features the sum of which are just as distinctive for these species, respectively, as for any given species in the genus. However, various other populations in the *S. spathulatum* complex have a series of distinctive characteristics, although not as striking as those of the named taxa in this complex. Further study of the *S. spathulatum* complex by methods such as those used by Farrell & James (1979) may show that some of these populations are reproductively isolated from each other. If there is reproductive isolation among populations that also have some consistent suites of morphological features that permit them to be distinguished, one could easily name other species or subspecies in the *S. spathulatum* complex. This complex represents an excellent group for further biosystematic studies. This complex is characterized by the presence of glandular hairs on inflorescences and (in taxa other than *S. coatesianum*) leaves, yellow flowers, and throat appendages which are basically composed of four pairs of short dentate appendages alternating with three rounded, shining appendages. Populations differ with respect to expression of these appendages. In *S. coatesianum*, the dentate appendages have subdivided tips, and are here

termed laciniate. Study of the throat appendages has revealed numerous distinctive variations (Lowrie, unpublished) which should be taken into account in further studies. In addition to the laciniate throat appendages and presence of dense nonglandular trichomes on leaves, *S. coatesianum* is distinctive on the basis of leaf shape. It is the only taxon in the *S. spathulatum* complex in which leaves are linear-oblanceolate with obtuse tips, and it is the only taxon in the complex in which leaves have upwardly curved margins. In addition, *S. coatesianum* is unique within the complex in the obovate shape and hyaline margins of its calyx lobes.

***Stylium cymiferum* A. Lowrie & S. Carlquist, spec. nov. HOLOTYPE:**

In loam and laterite soils of open wandoo forest on the north side of the Calingiri-Wongan Hills road, 3.9 km east of the Great Northern Highway, Western Australia, 27 October 1990, *Allen Lowrie 139* (PERTH). Isotype: RSA.

Perennis caudice caespitosa, ramosa. Folia radicalia rosulata, supra subtusque breviter glanduloso-pubescentes, oblanceolata, apice acuta, petiolata, chartacea, supra olivacea et subtus pallide, folia sicca brunnea, petiolo inclusa circa 1 cm longa, 2-3 mm lata. Scapi glabri, 14-26 cm alti, paniculati. Pedicelli 5 mm longi, prophyllo minimis instructi, sparse glandulosi. Calycis glaberrimi, tubus angustus, lobis ellipticis acutis subaequilongus. Corolla flava, laciniae ovatae, 4.0-4.5 mm longae, 3.5-4.0 mm latae. Fauci appendices 8, breve dentiformis, geminatis, et 3 globiformes. Labellum exappendiculatum et acuminatum. Capsula et semina ignota.

Caespitose perennial with branched stem. Leaves basal and rosetted, with short glandular hairs both above and below, apex acute, petiolate, chartaceous, olive green above and paler below, brownish when dried, about 1 cm long (petiole included) and 2-3 mm wide. Inflorescences glabrous, 14-26 cm tall, paniculate. Pedicels 5 mm long, provided with minimal bracteoles, sparsely glandular. Ovaries glabrous and slender, almost equal in length to the elliptic acute calyx lobes. Corolla yellow, corolla lobes ovate, 4.0-4.5 mm long, 3.5-4.0 mm wide. Throat appendage 8 dentiform in pairs, and 3 globose. Labellum without appendages, acuminate. Capsule and seeds unknown.

Stylium cymiferum (Fig. 4) is a member of the *S. spathulatum* complex discussed above in connection with the preceding species. Within this complex, *S. cymiferum* is distinctive in its branched inflorescences, the lower portions of which are composed of cymose units noted in the species name. Also distinctive are the very short oblanceolate leaves in dense, closely grouped rosettes. The calyx lobes are elliptical and acute, and do not quite match those of other taxa in the complex. The throat appendages of *S. cymiferum* are much like those figured for *S. lineatum* by Erickson (1958).

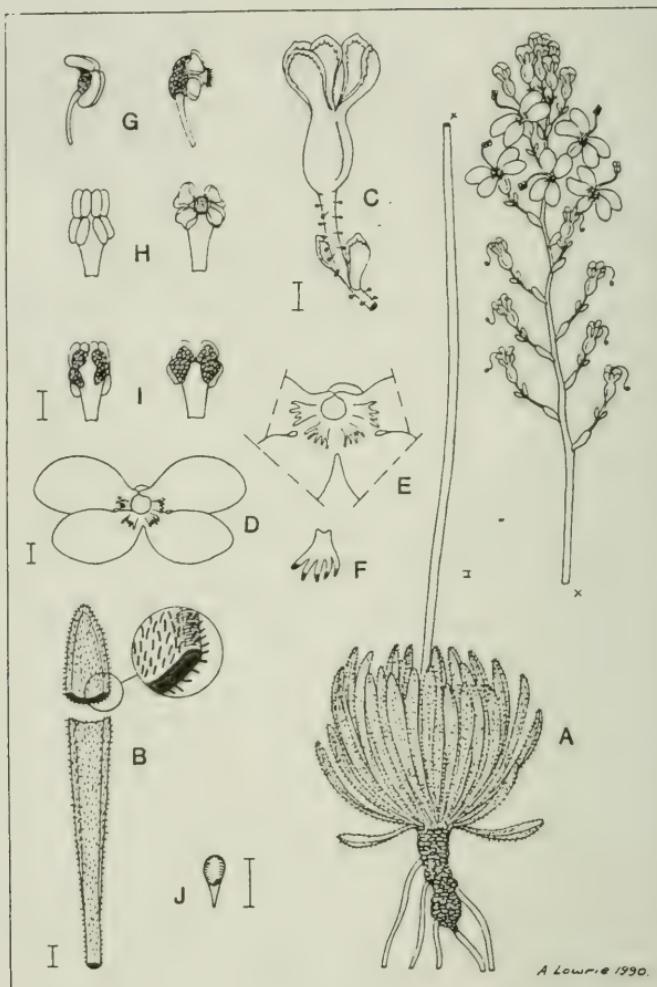
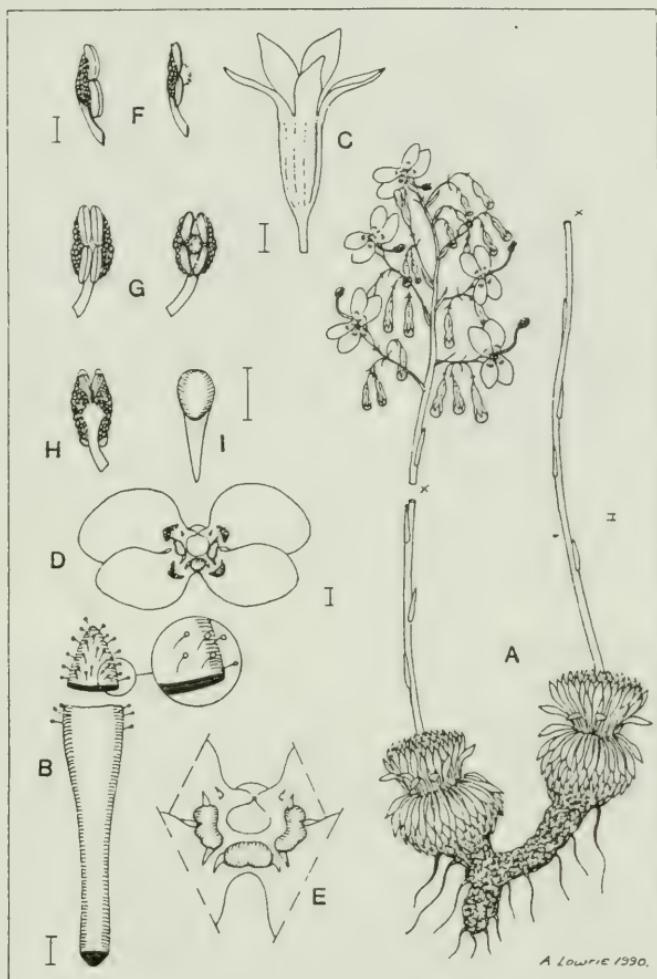


Figure 3. *Stylidium coatesianum*. A. Habit of plant. B. Leaf, with enlarged portion. C. Pedicel, ovary, and calyx lobes. D. Face view of corolla. E. Throat of corolla. F. Throat appendage, enlarged. G. Lateral view of column tip (with stigma grown out, right). H. Face view of column tip (with stigma grown out, right). I. Back of column tip (at stigmatic stage, right). J. Labellum. Scale = 1 mm.



A Lowrie 1990.

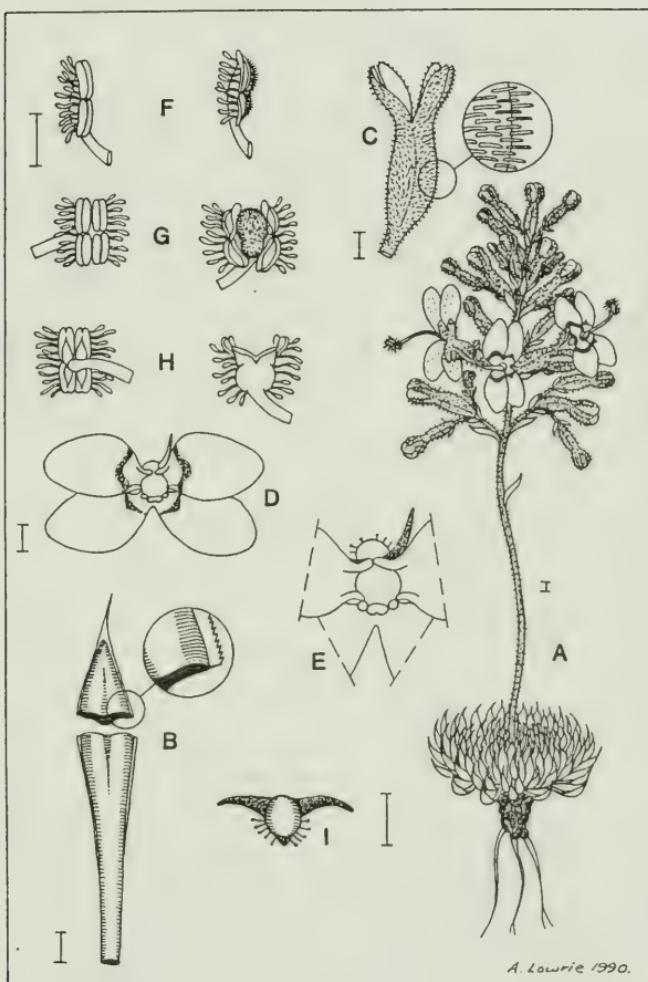
Figure 4. *Stylium cymiferum*. A. Habit of plant. B. Leaf, with enlarged portion. C. Ovary and calyx lobes. D. Face view of corolla. E. Throat of corolla, to show appendages. F. Lateral view of column tip (with stigma grown out, right). G. Face view of column tip (with stigma grown out, right). H. Back of column tip. I. Labellum. Scale = 1 mm.

Stylium drummondianum A. Lowrie & S. Carlquist, *spec. nov.* HOLO-TYPE: In gravelly laterite soils under *Dryandra hewardiana* and *Casuarina helmsii* 10.6 km northwest of Three Springs on The Midlands Road, Western Australia, 22 September 1990, *Allen Lowrie 103* (PERTH). Iso-type: RSA.

Perennis manifeste nodoso-congestia, ramosis. Folia omnia radicaria anguste linearia, apice incurvato-setosa, argenteo-viridia, infra scarioso-carinata, margine scarioso-serrata, glabra, 1.0-1.5 cm longa, 2 mm lata. Scapi minute nonglanduloso-piliferi, 5-10 cm alti, paniculati laxi subthyrsoides, pedicelli bracteis lanceolato-linearibus scarioso-marginibus suffulti basi prophyllis 2 similibus minoribus praediti. Calycis tubus elongatus, sensim in pedicellum attenuatus, dense pilis brevissimis nonglandulosis instructus. Calycis lobis dense nonglanduloso-piliferis ca. 2 mm longi, late oblongi obtusis, anteriores 2 fere usque ad apicem, 3 posteriores liberi. Flores verticali orientati. Corollae roseae, laciniae e basi rubromarcatae, faux flavum. Corollae laciniae ellipticae, 4 mm longae, 2.5-1.7 mm latae. Appendices faucis 4 (usque connati), rotundatae. Labellum orbiculatum, glanduliferum, basi appendiculis lanceolatis instructum. Capsula et semina ignota.

Perennial with short congested nodose branches. Leaves all in basal rosettes, linear, apex with an incurved seta, silvery green, with a scarious ridge below, margins scarious-serrate, glabrous, 1.0-1.5 cm long, 2 mm wide. Inflorescence 5-10 cm tall, covered with minute nonglandular hairs, pedicels subtended by scarious margined linear-lanceolate bracts with pairs of minute paired similar bracteoles below each flower. Ovary elongate, 6-8 mm long, tapering gradually into the pedicel, densely covered with nonglandular hairs, calyx lobes also thus pubescent, 2 anterior lobes united to their tips, 3 posterior ones free. Flowers oriented vertically rather than horizontally (the column thus appears to operate laterally). Corolla pink, lobes marked red at bases, the throat yellow. Corolla lobes elliptic, 4 mm long, 2.5-2.7 mm wide. Throat appendages 4 (two of them closely paired), rounded. Labellum orbicular, with a pair of lanceolate appendages at the base. Capsule and seeds unknown.

Stylium drummondianum (Fig. 5) belongs to the group of species that includes *S. hispidum* Lindl., *S. miniatum* Mildbraed, *S. piliferum* R. Br., and *S. pubigerum* Sond. From these species, it differs by having nodose stems; leaves hyaline-carinate below; leaf margins minutely serrate; short nonglandular hairs densely covering inflorescences, pedicels, ovaries, and calyx lobes; vertical orientation of flowers (so that the column, instead of working vertically, operates laterally); and three minute rounded throat appendages (one of them bilobed) in the corolla.



A. Lowrie 1990.

Figure 5. *Stylium drummondianum*. A. Habit of plant. B. Leaf from basal rosette, with enlarged portion. C. Ovary and calyx lobes, with enlarged portion. D. Face view of corolla. E. Throat of corolla, to show appendages and labellum. F. Lateral view of column tip (with stigma grown out, right). G. Face view of column tip (with stigma grown out, right). H. Back of column tip (stigmatic stage, right). I. Labellum. Scale = 1 mm.

Stylium keigheryi A. Lowrie & S. Carlquist, *spec. nov.* HOLOTYPE: In acid black peaty sand overlying rock, on the summit of Bluff Knoll, Stirling Range National Park, Western Australia, 28 February 1986, *Gregory Keighery* 7958 (PERTH). Isotype: RSA.

Perennis praeter inflorescentiam glabra caulescens. Innovations erectae, ad basi nodosae, teretes, sparse et subverticillati-foliatae. Folia atro-olivacea, subcoriacea, minute papillata, glabra, lanceolata, mucronata, epetiolata, circa 5 mm long, 1 mm lata. Flores in cymum glabrum. Pedunculus uniflorus bibracteolatis, tenuis, teres, ad 3 cm longus. Pedicelli sparse glandulosi. Calycis tubus obovato-turbinatus quam lobi lanceolati-obtusiusculi vix 2 mm longi paulo brevior. Corolla roseo-purpurea, laciniae obovatae-oblongae, 3 mm longae, 1.7-2.3 mm latae. Faucis appendices filiformes, apice capitatae, manifeste breviter pubescentes. Labellum breve exappendiculatum acuminatum. Capsula et semina ignota.

Perennial with stems up to inflorescences glabrous. Innovations erect, nodose at ground level, slender and terete, with scattered verticils of leaves. Leaves deep olive colored, subcoriaceous, glabrous but with papillate epidermal cells, lanceolate and mucronate, sessile, about 5 mm long and 1 mm wide. Flowers disposed in a lax glabrous cyme. Peduncles one flowered and bibracteolate, slender, up to 3 cm long. Pedicels sparsely glandular. Ovary ovate-turbinate, a little shorter than the calyx lobes, which are up to 2 mm long, lanceolate, and obtuse. Corolla red-purple, lobes obovate-oblong, 3 mm long, 1.7-2.3 mm wide. Throat appendages filiform, capitate, shortly pubescent. Labellum with short appendages, acuminate. Capsule not seen.

Stylium keigheryi (Fig. 6) is a distinctive species that may have escaped notice because its locality is the highest point in southwestern Australia, and thus this species flowers later than other *Stylium* species. The species most similar to *Stylium keigheryi* is *S. pritzelianum* Mildbraed; it has the following features that differ from those of *S. pritzelianum* (Carlquist 4048 [PERTH, RSA]), contrasting features of the latter in parentheses: stems with swollen nodes near bases (nodes slightly swollen); stems terete (hyaline winged); leaves deep green (light green); leaves minutely papillate (with epidermal cells flat), lanceolate, not tapering into a petiole; peduncles one flowered (one or two flowered), long; labellum with two minute appendages (no appendages).

Stylium mimeticum A. Lowrie & S. Carlquist, *spec. nov.* HOLOTYPE: In sand, along Great Northern Highway north of Bullsbrook, 1 km south of Wandena Road (south end) on east side of the Highway, 3 December 1989, *Allen Lowrie* 243 (PERTH). Isotype: RSA.

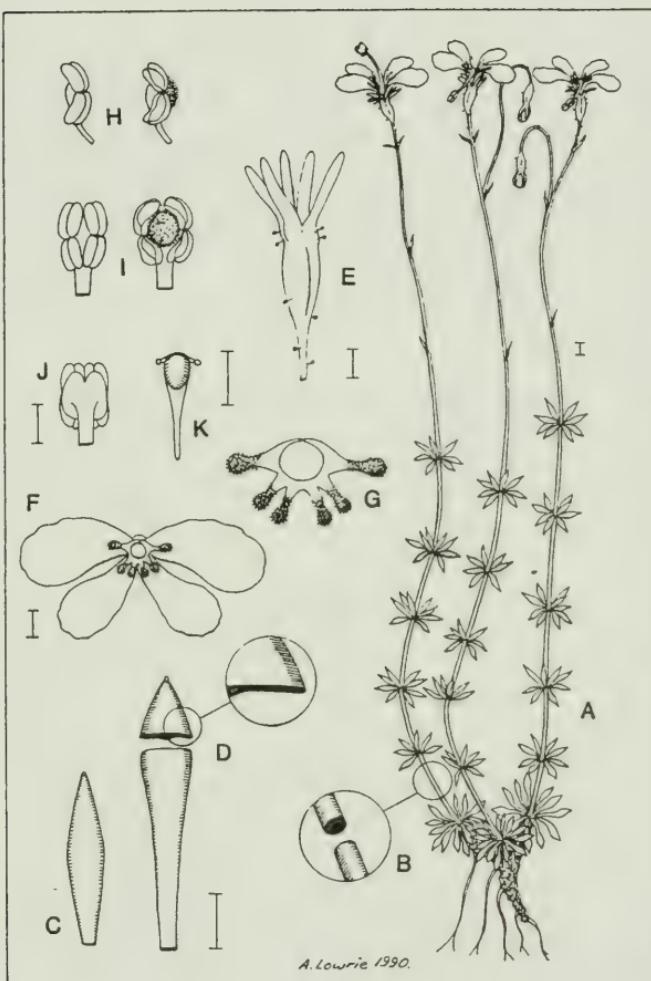


Figure 6. *Stylium keigheryi*. A. Habit of plant. B. Portion of stem, enlarged. C. Leaf from whorl on inflorescence axis. D. Leaf from basal rosette. E. Ovary and calyx lobes. F. Face view of corolla. G. Throat appendages, enlarged. H. Lateral view of column tip (with stigma grown out, right). I. Face view of column tip (with stigma grown out, right). J. Back of column tip. K. Labellum. Scale = 1 mm.

Annua pilis glanduliferis adspersa imprimis in inflorescentia. Folia radicalia glabra elliptica, plana, 5 mm longa, 2 mm lata, in petioli subaequilongum vel brevem attenuata. Scapi solitarii corymbum laxiflorum pauciflorum gerentes, 5-6 cm alti. Flores longipedicellati, satis conspicui. Calycis tubus subglobosus, 2 mm longus et latus, lobi 1 mm longi, subaequales. Corollae tubus perbrevis, laciniae inaequales, posteriores 2 cuneatae, breve tridentatae, 4 mm longae, anteriores 2 panduriformes, 3.5 mm longae. Corollae laciniae ad apice roseae, roseomaculatae, ad basi albae. Appendices faucis 0. Labellum oblongum, 1.5 mm longum, 0.6 mm latum, bidentatum. Columna submedio geniculata, geniculo processu retrorsum et adpressum acuminatum instructa. Stigma barbatum inter antheras. Capsula ovato-globosa, 1.5 mm longa. Semina ignota.

Annual with glandular hairs scattered primarily in the inflorescence. Leaves in a basal rosette, glabrous, elliptical, flat, 5 mm long, 2 mm wide, narrowed into a petiole as long as the lamina, which is 2.5 mm. Inflorescence solitary, a few flowered lax corymb, 5-6 cm tall. Flowers long pedicellate, rather conspicuous. Ovary subglobose, 2 mm in diameter. Corolla tube very short. Corolla lobes unequal, the posterior 2 cuneate, shortly tridentate, 4 mm long, the anterior 2 panduriform, 3.5 mm long. Corolla lobes pink at tips, white at bases, marked red between. Throat appendages lacking. Labellum elliptical, 1.5 mm long, 0.6 mm wide, bidentate. Column bent near the middle, provided with a retrorse acuminate appressed appendage. Stigma barbate, among the anthers. Capsule subglobose, 2 mm long. Seeds unknown.

Stylidium mimeticum (Fig. 7) is closely related to *S. calcaratum* R. Br. and the two species recently segregated from *S. calcaratum*, *S. ecorne* Farrell & James, and *S. edentatum* Carlquist & Lowrie. From these species, *S. mimeticum* differs by its floral corolla shape; corolla color pattern (which appears to mimic that of *S. utricularioides* Benth., with which it grows); its labellum shape and outline; and its column appendage. Illustrations of the three species with which *S. mimeticum* is compared here are offered by Carlquist & Lowrie (1989). The possibility that flowers of a *Stylidium* might mimic flowers of another plant was examined earlier (Carlquist 1979).

Stylidium diuroides Lindl. subsp. **paucifoliatum** A. Lowrie & S. Carlquist, *subspec. nov.* HOLOTYPE: In white silica sand, along the N side of railway line, on Midlands Road W of Mingenew, 15.6 km E of the Brand Highway Junction, Western Australia, 23 September 1990, Allen Lowrie 240 (PERTH). Isotype: RSA.

Ab species differt: Herba paucifoliata, folia glabra et nonpapillata; scapi teres, persaepe 2 verticillis bracteis instructi; calycis lobi glabri sed ad margine glandulosi; calycis tubus dense glandulosus.

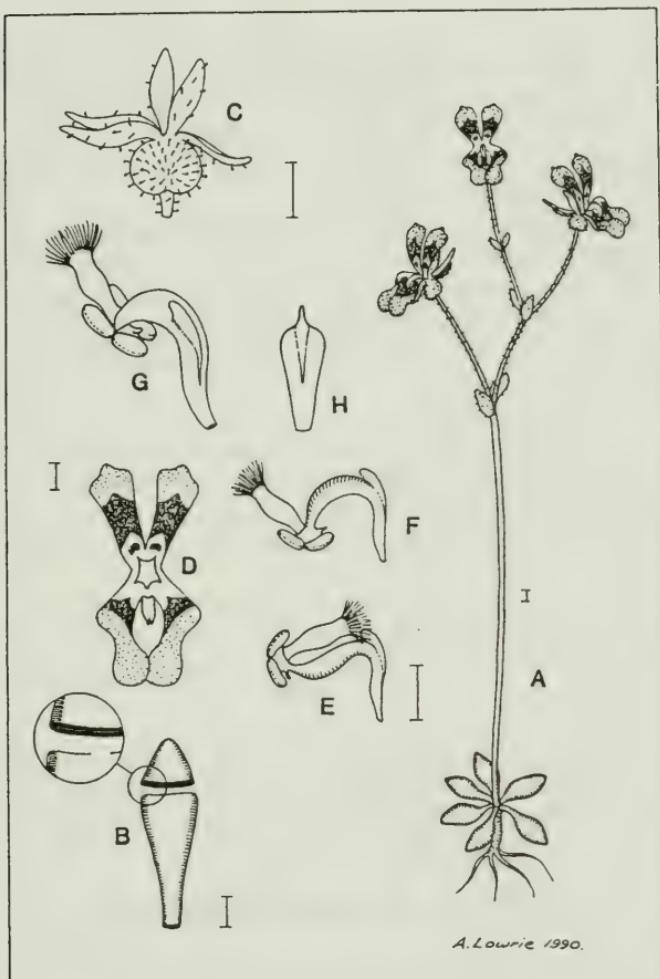


Figure 7. *Stylium mimeticum*. A. Habit of plant. B. Leaf, with enlarged portion. C. Ovary and calyx lobes. D. Face view of corolla. E. Lateral view of column, triggered. F. Lateral view of column, reset. G. Oblique view of column, not yet triggered. H. Dorsiventral view of column, showing retrorse tooth. Scale = 1 mm.

This new subspecies (Fig. 8) differs from *Stylidium diurooides* subsp. *diurooides* (Fig. 9) (features of which are cited in parentheses below), in having a sparsely leaved rosette, with the leaf surface smooth (rather than densely papillate when viewed with magnification); a usually two whorled scape (rather than a one whorled scape); a terete inflorescence axis (rather than an axis quadrangular or with more than four sides); glabrous calyx lobes, but with glandular margins (rather than completely glabrous); and densely glandular ovaries (rather than sparsely glandular).

This is the plant noted by Erickson (1958, p. 135) when she says, "Material from Mt. Lesueur is sparsely leaved, 2-whorled, and with calyx lobes twice as long as the tube, very glandular hairy." A few single whorled specimens can, however, be found in any given population, and calyx lobes twice as long as the ovary can also be found in subsp. *diurooides*. Erickson has accurately cited the other differences, however.

Stylidium emarginatum Sond. subsp. *exappendiculatum* A. Lowrie & S. Carlquist, *subspec. nov.* HOLOTYPE: in clayey sand near the Beaufort River Bridge on the Perth-Albany Highway, Western Australia, 22 September 1989, *Allen Lowrie 244* (PERTH). Isotype: RSA.

Ab species differt: folia linearia, circa 17 mm longa, 1.5 mm lata; bracteis nonverticillatis, lanceolatis; calycis lobi ovati et obtusi; appendices faucis nullae; labellum curtum, 1.5 mm longum, obtusum.

This new subspecies (Fig. 10) differs from subsp. *emarginatum* (Fig. 11) by having leaves linear, about 17 mm long and 1.5 mm wide; inflorescence bracts lanceolate, not in a verticil; calyx lobes ovate and obtuse; throat appendages absent; labellum short, 1.5 mm long, obtuse.

REDISCOVERIES AND RANGE EXTENSIONS

Stylidium articulatum R. Br. This striking species (Fig. 12) was collected by Robert Brown and by James Drummond (Mildbraed 1907) but has not been collected since, and neither of those collectors give locality data. The reason it has escaped notice is that this plant grows on the (shady) south sides of granite marine bluffs. Many individuals occur in shallow caves where they receive no direct sunlight at all. The specimen illustrated in Fig. 12 came from Mermaid Point, on the Albany Coast, and was collected on 7 December 1989 (*Allen Lowrie 245* [PERTH, RSA]).

Stylidium longitubum Benth. Only a single individual of this species has hitherto been seen since the type collection. A photograph of that individual (Carlquist 1969) shows that the floral shape and patterns are not like those illustrated by Erickson (1958), who evidently illustrated *S. utricularioides* by

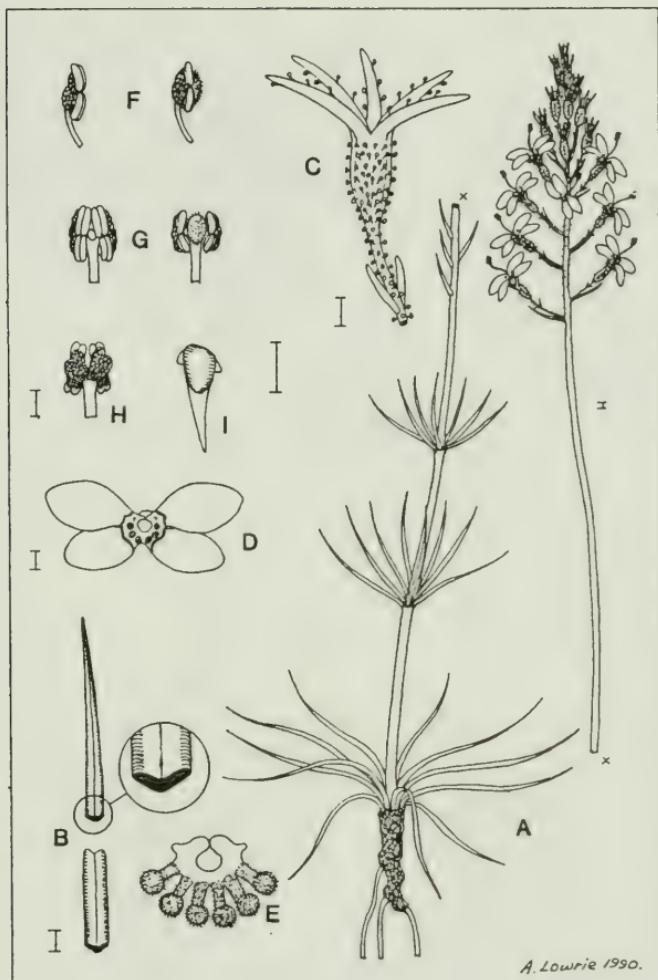


Figure 8. *Stylium diuroides* subsp. *paucifoliatum*. A. Habit of plant. B. Leaf, with enlarged portion. C. Pedicel, ovary, and calyx lobes. D. Face view of corolla. E. Throat appendages, enlarged. F. Lateral view of column tip (with stigma grown out, right). G. Face view of column tip (with stigma grown out, right). H. Back of column tip. I. Labellum. Scale = 1 mm.

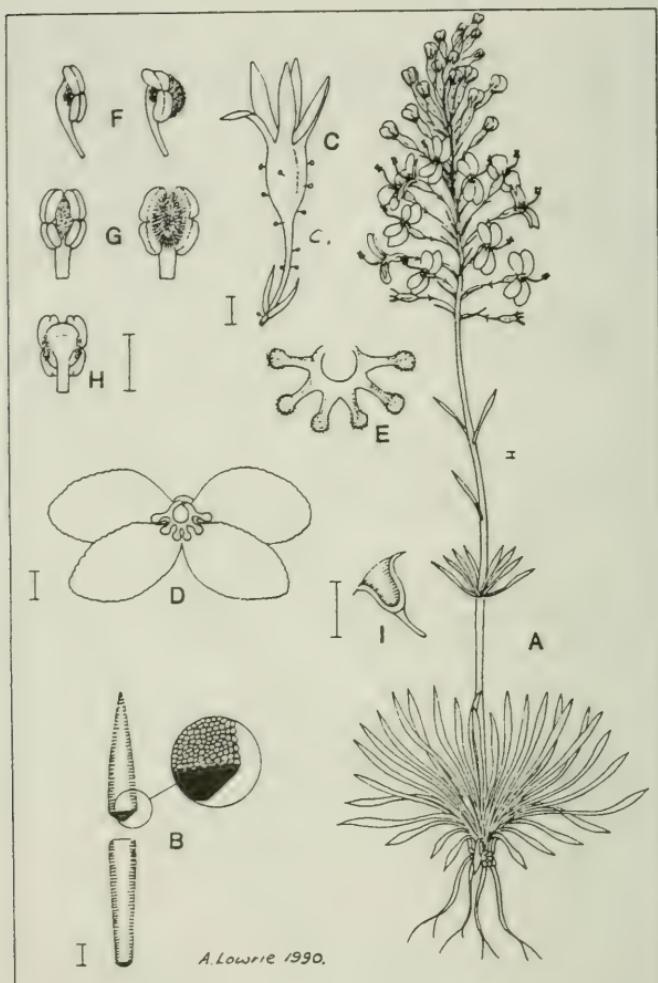


Figure 9. *Stylidium diurooides* subsp. *diurooides*. A. Habit of plant. B. Leaf, with enlarged portion. C. Pedicel, ovary, and calyx lobes. D. Face view of corolla. E. Throat appendages, enlarged. F. Lateral view of column tip (with stigma at right). G. Face view of column tip (with stigma grown out, right). H. Back of column tip. I. Labellum. Scale = 1 mm.

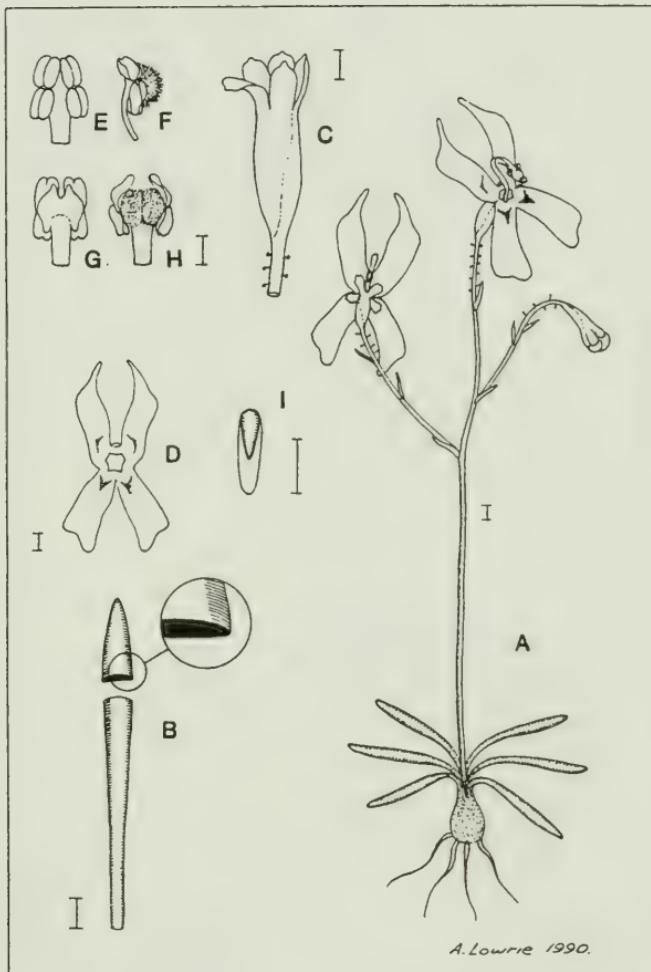


Figure 10. *Stylium emarginatum* subsp. *exappendiculatum*. A. Habit of plant. B. Leaf, with enlarged portion. C. Ovary and calyx lobes. D. Face view of corolla. E. Face view of column tip. F. Lateral view of column tip with stigma grown out. G. Back of column tip. H. Face view of column tip with stigma grown out. I. Labellum. Scale = 1 mm.

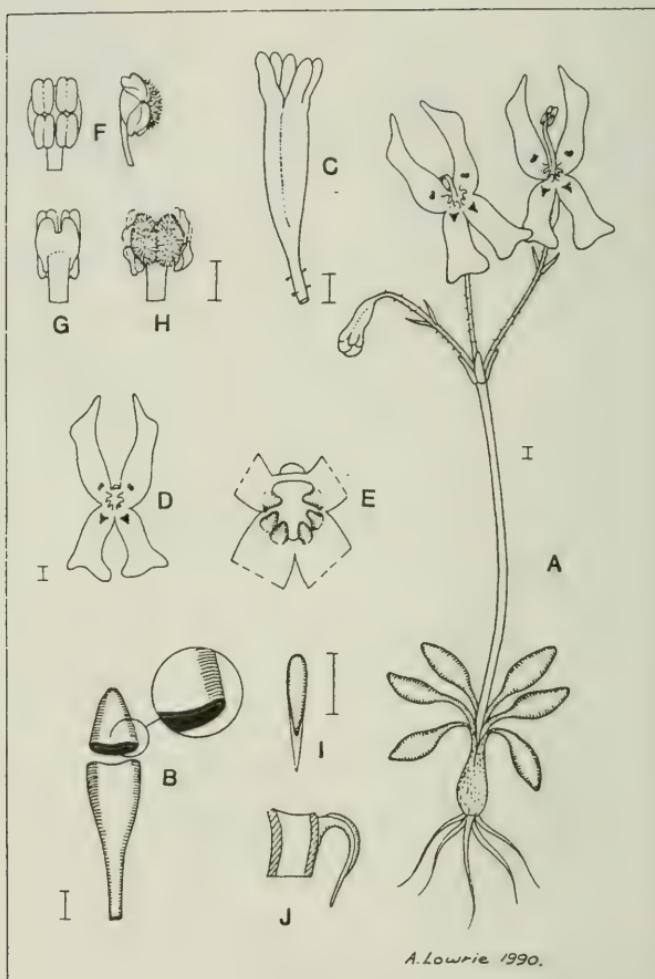


Figure 11. *Stylidium emarginatum* subsp. *emarginatum*. A. Habit of plant. B. Leaf, with enlarged portion. C. Ovary and calyx lobes. D. Face view of corolla. E. Throat of corolla to show appendages. F. Column tip (face view left, lateral view with stigma grown out at right). G. Back of column tip. H. Face view of column tip with stigma grown out. I. Labellum. J. Longitudinal section of corolla tube, showing labellum. Scale = 1 mm.

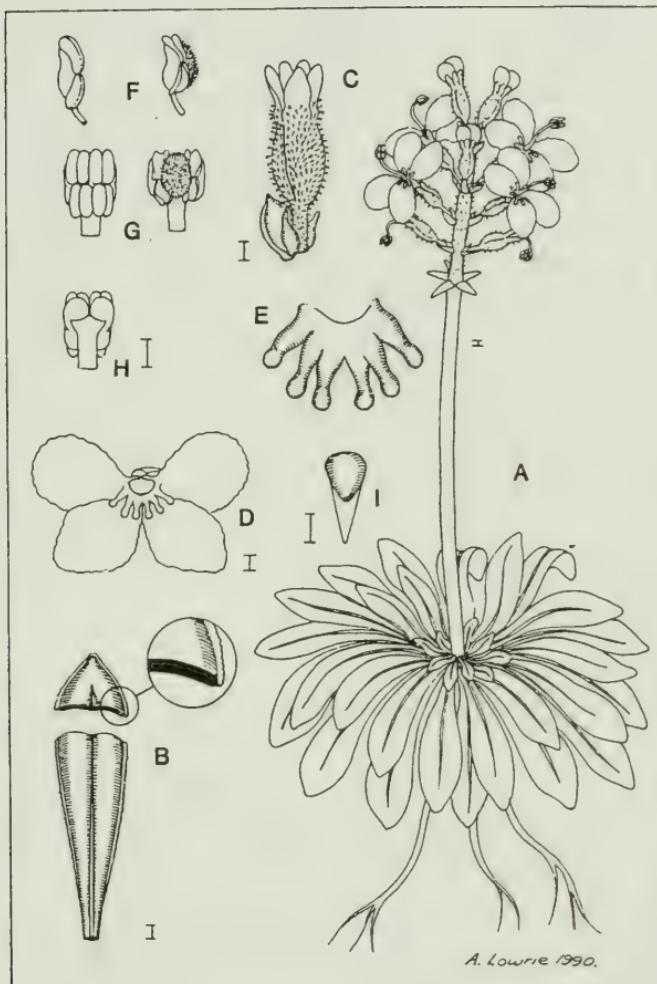


Figure 12. *Stylium articulatum*. A. Habit of plant. B. Leaf, with enlarged portion. C. Pedicel, bract, bracteoles, ovary, and calyx lobes. D. Face view of corolla. E. Throat appendages, enlarged. F. Lateral view of column tip (with stigma grown out, right). G. Face view of column tip (with stigma grown out, right). H. Back of column tip. I. Labellum. Scale = 1 mm.

mistake for this species. Although Mildbraed (1907) relegated *S. longitubum* to *S. utricularioides*, it is quite distinct. Numerous individuals were found in a locality not far from the locality reported by Carlquist (1969). These were found in a paddock on the west side of Railway Parade, 0.5 km north of Apple Road, Upper Swan, and were collected on 12 November 1989 (*Allen Lowrie 246 [PERTH, RSA]*).

Stylium pseudohirsutum Mildbraed. This species, described from a Drummond specimen lacking locality data, was collected near Needilup (Carlquist 1966). The species can now also be reported from the Beaufort River Bridge Reserve south of Williams, on the Perth-Albany Highway, where it was collected on 19 November 1989 (*Allen Lowrie 247 [PERTH, RSA]*).

Stylium pygmaeum R. Br. and *S. exoglossum* Erickson & Willis. *Stylium pygmaeum* (Fig. 13) has not been reported in this century. Individuals agreeing in all details (such as presence of the labellum on the outer surface of the corolla tube) with the type were collected on the upper Hay River on 7 December 1989 (*Allen Lowrie 248 [PERTH, RSA]*) and also 20 km west of Albany on 5 December 1989 (*Allen Lowrie 249 [PERTH]*). These individuals are from much the same region and season as those named by Erickson & Willis (1955) as *S. exoglossum* Erickson & Willis. Evidently Erickson (1958) thought that the type specimen of *S. pygmaeum* had merely "purple spots" at the corolla throat, and the individuals named as *S. exoglossum* by Erickson & Willis (1955) are in all respects referable to *S. pygmaeum*. *Stylium exoglossum* thus must be reduced to synonymy under *S. pygmaeum*.

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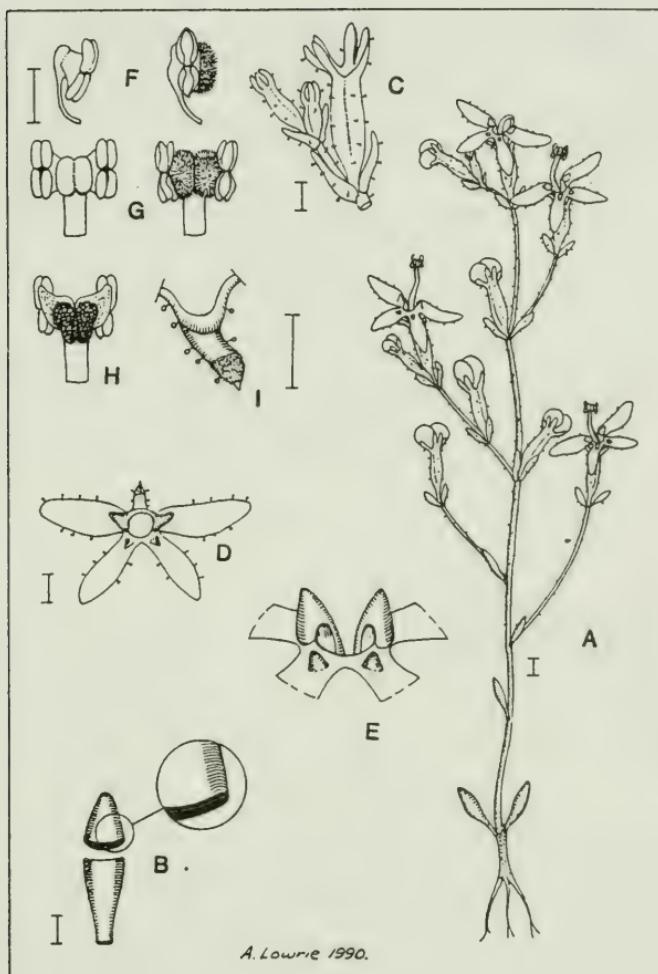


Figure 13. *Stylium pygmaeum*. A. Habit of robust plant. B. Leaf, with enlarged portion. C. Pedicel and bracts with buds, bracteoles, ovary, and calyx lobes. D. Face view of corolla. E. Throat of corolla, showing appendages, enlarged. F. Lateral view of column tip (with stigma grown out, right). G. Face view of column tip (with stigma grown out, right). H. Back of column tip. I. Labellum. Scale = 1 mm.

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**COREOCARPUS IXTAPANUS B. TURNER (ASTERACEAE -
HELIANTHEAE - COREOPSIDINAE) A SYNONYM OF *C. CONGREGATUS*
(S.F. BLAKE) E.B. SMITH**

E. B. Smith

Department of Biological Sciences, University of Arkansas, Fayetteville,
Arkansas 72701 U.S.A.

ABSTRACT

A new species, *Coreocarpus ixtapanus* B. Turner, from the state of México, represents depauperate material of *C. congregatus* (S.F. Blake) E.B. Smith. It should be synonymized with the latter species.

KEY WORDS: Asteraceae, Heliantheae, Coreopsidinae, *Coreocarpus*, México

Turner (1991) recently named a new species of Mexican *Coreocarpus*, *C. ixtapanus* B. Turner, from the state of México and noted its close similarity to *C. congregatus* (S.F. Blake) E.B. Smith. The new species purportedly differs from *C. congregatus* in being smaller, with smaller leaves, smaller heads with fewer ray and disk florets, and yellow anthers (vs. decidedly purple in *C. congregatus*).

Since I recently revised the genus *Coreocarpus* (Smith 1989), I was interested in examining type material for *C. ixtapanus* and borrowed the holotype from COLO. The holotype sheet (*D.L. & M.L. Denham 172*) includes ten mounted individuals. All of these appear to me to represent depauperate specimens of *C. congregatus*. They are typical in having ca. 6 nodes below the first head, the leaves drying and falling from the lower (often 3) nodes, in pubescence, in leaf cutting and leaf shape, in ligule shape and color, and in achene morphology. Four of the ten individuals had obvious anthers developed (the other six lacked heads or had immature heads). I numbered the four plants and noted that their anther color varied from yellowish brown to brownish purple or blackish purple. In other words, the anther color on the holotype plants was variable and while some individuals had anthers definitely lighter in color than usual *C. congregatus*, at least one (number 3) had anthers approaching the "decidedly purple" of *C. congregatus*.

I suggest that *Coreocarpus ixtapanus* should not be maintained at the species (nor even the variety) level. The holotype collection provides a range extension for *C. congregatus* (from the states of Sinaloa and Durango to the state of México) and shows that anther color in the species can range to shades of yellowish brown.

In brief, *Coreocarpus ixtapanus* B. Turner should be synonymized under *C. congregatus* (S.F. Blake) E.B. Smith.

ACKNOWLEDGMENTS

My thanks to T.A. Ranker, Curator COLO, for the loan of the holotype.

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CORRECTION OF A NAME COMBINATION IN *GALIUM* (RUBIACEAE)

Lauramay T. Dempster

Jepson Herbarium, University of California, Berkeley, California 94720 U.S.A.

ABSTRACT

A new name combination published in 1990 omitted the required page number. The omission is hereby corrected.

KEY WORDS: *Galium*, Rubiaceae, South America

It has been called to my attention that, by failing to include a page number, I have not validly published one of my name combinations (ICBN, Article 33.2). Because someone now wishes to use this name, I would like to correct the oversight.

The name combination, published on page 325 in *Allertonia* 5, (1990) should have read as follows:

Galium richardianum (Gillies ex Hook. & Arn.) Endl. subsp. *pusillum* (Gillies ex Hook. & Arn.) Dempster, *comb. nov.* BASIONYM: *Rubia pusilla* Gillies ex Hook. & Arn., Bot. Misc. 3:363. 1833. Type from San Luis, Argentina, Gillies (K, fide Ehrendorfer).

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Greuter, W., H.M. Burdet, W.G. Chaloner, V. Demoulin, R. Grolle, D.L. Hawksworth, D.H. Nicolson, P.C. Silva, F.A. Stafleu, E.G. Voss, & J. McNeill. 1988. *International Code of Botanical Nomenclature*. Adopted by the Fourteenth International Botanical Congress, Berlin, Jul-Aug 1987. *Regnum Veg.* 118.

NOVELTIES AND NEW COMBINATIONS IN MEXICAN HEDEOMA (LAMIACEAE)

B.L. Turner

Department of Botany, University of Texas, Austin, Texas 78713 U.S.A.

ABSTRACT

A new species, *Hedeoma irvingii* B. Turner, and a new variety, *H. palmeri* A. Gray var. *galeanum* B. Turner, are described. Both are confined to the state of Nuevo León and were previously placed within the broad confines of *H. palmeri* by Irving in his recent monograph of the genus. In addition, *H. hyssopifolium* A. Gray var. *chihuahuense* Henrickson is raised to specific rank. A map showing the distribution of these several taxa is provided.

KEY WORDS: *Hedeoma*, Lamiaceae, taxonomy, México

Routine identification of Mexican plants has revealed the following novelties.

Hedeoma irvingii B. Turner, *sp. nov.* (Fig. 1). TYPE: MÉXICO. Nuevo León: Mpio. García, 20 mi E of the Ford Clock in Saltillo along highway 40, hence N along the road to the Microwave Station Mariposa, ca. 1 mi from the summit along the north slopes, growing with desert shrubs (*Agave lechugilla*, *Gutierrezia* sp., etc.) and grasses (*Bouteloua* sp.), 10 Nov 1976, *J.M. Smith (Jackie Poole), B.L. Turner & Molly A. Whalen 783* (HOLOTYPE: LL!).

Hedeoma palmeri A. Gray similis sed habitu suffruticoso caulinibus aliquantum decumbentibus vel inclinatis usque ad 30 cm altis et foliis parvioribus marginibus denticulatis differt.

Suffruticose sprawling perennial herbs to 30 cm high from rather woody rootstocks. Stems moderately to densely white hirsute, occasionally arising from slender rhizomes. Leaves mostly 10-15 mm long; petioles 1-4 mm long; blades broadly ovate to deltoid, smelling of mint when crushed, white hirsute on both surfaces, more densely so beneath, the margins denticulate to nearly

entire, the apices mostly narrowly obtuse to acute. Calyces densely pilose, mostly 7-9 mm long, the lower two lobes 2.0-3.0 mm long, the upper lobe 1.5-2.0 mm long. Corollas 14-17 mm long, pale lavender, the throat about 10 mm long. Fruit (nutlets) immature but clearly ovoid.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Nuevo León: just N of Estación Microondas "Mariposa" (ca. 3 km E of Coahuila state line), ca. 25° 40' N x 100° 45' W, 1600 m, desert shrublands, 24 May 1973, Johnston, et al. 11221 (MEXU, TEX); rocky slopes below El Fraile Peak, ca. 3 mi W of Grutas de Garcia, Dec 1961, R.F. Smith M652 (TEX).

Irving, examining the late flowering, atypical collections of Johnston, et al. (cited above), placed these (by annotation) in his concept of *Hedeoma palmeri* A. Gray, a species which has markedly different, much larger leaves, and occurs in more mesic sites (pine-oak forests), usually at higher elevations (mostly 1500-2200 m, occasionally lower along canyons). The type, however, collected in prime condition, shows the plants concerned to be markedly different from *H. palmeri* in leaf shape (abruptly petiolate), size (10-15 mm long, vs. 20-40 mm), vestiture (pilose vs. tomentulose or puberulent) and habitat (desert shrub vs. pine-oak woodland), the isolated arid mountain upon which it occurs being devoid of pine-oak woodlands, or seemingly so. Further, *H. palmeri* is a rather stiffly erect shrublet to 1 m high, while *H. irvingii* is a sprawling low suffruticose herb mostly less than 30 cm high.

It seems appropriate to name the species for my former student, Dr. Robert Irving, who has provided an excellent monograph of the complex. He is currently a self employed environmental lawyer and consultant working out of Hot Springs, Arkansas.

***Hedeoma palmeri* A. Gray subsp. *galeanum* B. Turner var. *galeanum* B.**

Turner, subsp. et var. nov. TYPE: MÉXICO. Nuevo León: Mpio. Iturbide, 5 mi E of Iturbide along highway 60, area of Canyon Santa Rosa, ca. 3800 ft, scattered on open rocky banks, 5 Jul 1963, R.L. McGregor, et al. 16 (HOLOTYPE: LL!).

Differet a *Hedeoma palmeri* A. Gray var. *palmeri* foliis bicolorebus paginis infernis dense tomentulosis.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Nuevo León: 22-25 mi W of Linares, 19 Jul 1958, Correll 19789 (LL); 4.1 mi S of Iturbide, 1800 m, 25 Oct 1982, Grimes 2326 (TEX); E slopes of Cerro Potosí, 2200-2700 m, Henrickson 18544 (TEX); Cerro Potosí, 15 Jul 1945, Hernandez 8 (TEX); Cerro Potosí, 2450 m, 8 Aug 1970, Hinton 17301 (TEX); below San Pedro Iturbide, 1070 m, 25 Sep 1978, Hinton 17605 (TEX); above El Carrizo, 1900 m, 16 Oct 1983, Hinton 18614 (TEX); Cerro El Gallo, 2100 m, 16 Oct 1987, Hinton 19165 (TEX); Cerro El Gallo, 2100 m, 21 Oct 1987, Hinton 19185

(TEX); E of Iturbide at "canyon mural," 26 Jul 1966, *Irving* 669 (TEX); Cerro Potosí, transition between pine forest and oak woodland, 24 Aug 1984, *Lavin* 4814 (TEX); 15 mi SW of Galeana, 15 Jul 1934, *Mueller* 1024 (TEX); ca. 75 km S of Galeana, 2000 m, 5 Aug 1978, *Sanders* 1208 (TEX); ca. 12 mi NW of Galeana, 20 Aug 1979, *Turner* A-27 (TEX); 6.5 mi W of Diesocho de Marzo, 20 Oct 1979, *Warnock* 2034 (TEX).

Irving (1968, 1980) was well aware of the reality of this taxon, calling it the "Galeana race" and correctly cited eight specimens. He also noted that the characters which distinguish the populations from the typical forms were maintained in transplant gardens. Nevertheless, Irving (1968) was of the opinion that the two population types "grade imperceptibly into one another." I do not find this to be the case. As shown in Fig. 2, all of the collections of the "Galeana race" cited by Irving (1980), and the considerable material collected since his study, are predominantly from the region about Galeana. The typical var. *palmeri* is more widespread, occurring from SE of Monterrey, Nuevo León to Hidalgo. Indeed, the two taxa do not appear to occur together, or near each other; however, occasional specimens of var. *palmeri* vary in the direction of var. *galeanum* (e.g., *Villarreal* 2341 [TEX]), and for this reason the taxon is described at the varietal level and given the rank of subspecies.

My colleague, Guy Nesom, has raised the propriety or necessity of treating this taxon as the only member of its subspecies, noting that the latter term is primarily used for clustering purposes. My response to that being, "Evolution does not always or necessarily create only neat allopatric intergrading varieties; the occasional variety is to be expected to show sufficient differentiation and isolation so as to be labeled a subspecies, much as the occasional species can be sufficiently differentiated morphologically so as to be considered a subgenus."

Hedeoma chihuahuense (Henrickson) B. Turner, *comb. nov., stat. nov.*

BASIONYM: *Hedeoma hyssopifolium* A. Gray var. *chihuahuensis* [sic] Henrickson, *Sida* 11:413. 1986.

In my comprehensive survey of *Hedeoma*, from which the above novelties were exposed, I conclude that *H. hyssopifolium* A. Gray var. *chihuahuense* Henrickson is fully deserving of specific rank, as well noted and illustrated by its author. While clearly related to *H. hyssopifolium*, it differs in so many characters from the latter, occupying differing habitats and markedly allopatric, it seems more consistent with classificatory concepts in *Hedeoma*, as espoused by most authors, to treat the taxon at the specific level (e.g., it is much more distinct than the *H. drummondii* Benth.-*H. reverchonii* A. Gray duo, both of which Irving (1980) maintains, in spite of considerable morphological intergradation between the two.

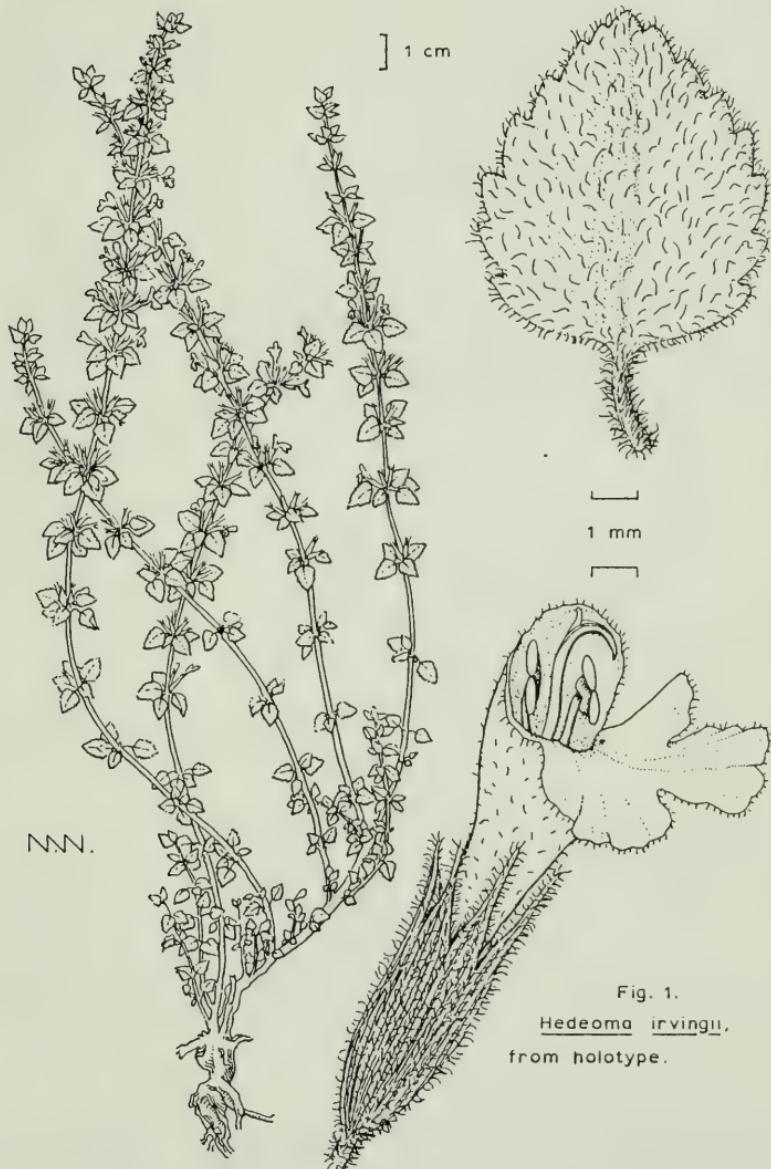


Fig. 1.
Hedeoma irvingii,
from holotype.

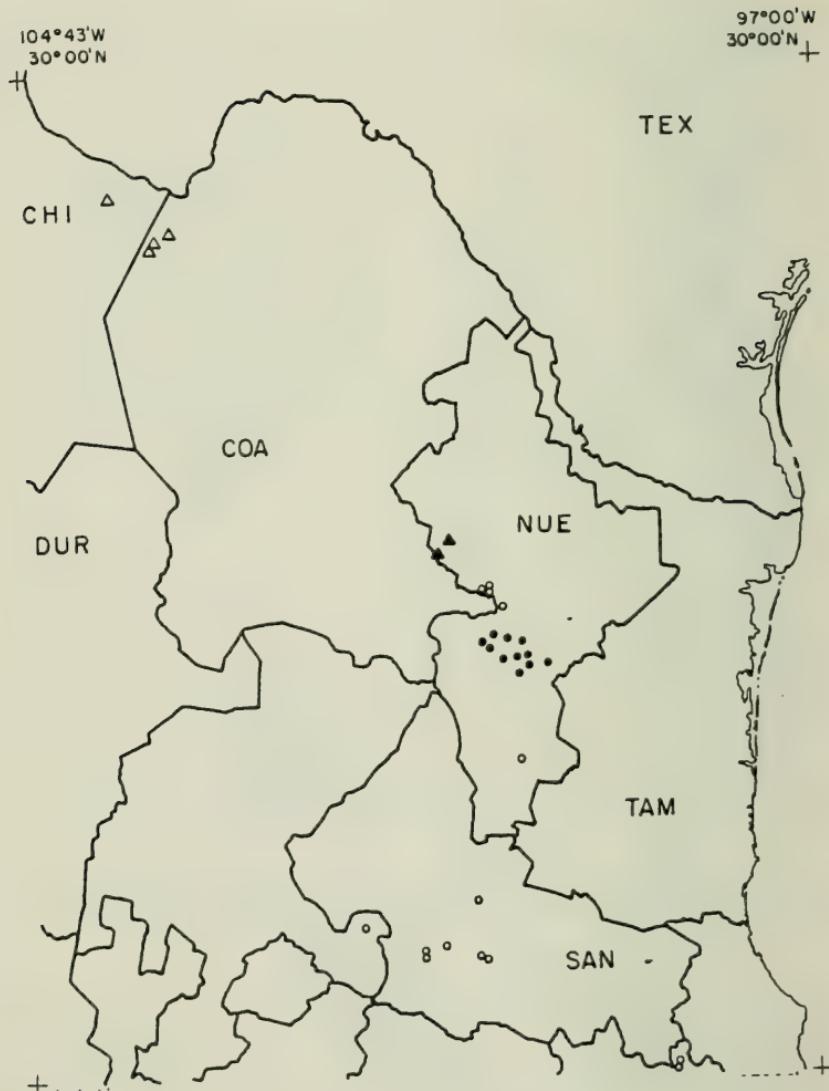


Fig. 2. Distribution of *Hedeoma chihuahuense* (open triangles), *Hedeoma irvingii* (closed triangles), *H. palmeri* var. *galeanum* (closed circles), and *H. p.* var. *palmeri* (open circles). A few collections of the latter from Hidalgo, México are not mapped.

ACKNOWLEDGMENTS

I am grateful to Dr. Guy Nesom for the Latin diagnoses and to him and Dr. T.P. Ramamoorthy for reviewing the manuscript. Nancy Webber provided the illustration.

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TAXONOMIC STATUS OF *BARROETEA GLUTINOSA* (ASTERACEAE,
EUPATORIEAE) AND ITS ALLIES: MORPHOLOGICAL EVIDENCE FOR THE
TRANSFER OF *BARROETEA* TO *BRICKELLIA*

B.L. Turner, K.-J. Kim, & J. Norris

Department of Botany, University of Texas, Austin, Texas 78713 U.S.A.

ABSTRACT

The phyletic position of the taxonomically controversial *Barroetea glutinosa* T. Brandegee, is investigated using microcharacters of flowers and fruits. It is concluded that the species stands somewhere between the genera *Barroetea* and *Phanerostylis* (*sensu* King & Robinson). Since the latter taxon is positioned *within* the genus *Brickellia* by several recent workers, all of *Barroetea* is transferred to *Brickellia*. This has necessitated the following name changes: *Brickellia problematica* B. Turner, *nom. nov.* (= *Barroetea glutinosa* T. Brandegee; non *Brickellia glutinosa* A. Gray); *Brickellia laxiflora* (T. Brandegee) B. Turner, *comb. nov.*; *Brickellia pavonii* (A. Gray) B. Turner, *comb. nov.*; and *Brickellia subuligera* (Schauer) B. Turner, *comb. nov.*

KEY WORDS: *Barroetea*, *Brickellia*, Eupatorieae, Asteraceae, México

Treatment of the small genus *Barroetea* for the Asteraceae of México (Turner & Nesom, *in prep.*) has led the senior author to pursue at some length a problem relating to the position of an anomalous member of this genus, *B. glutinosa*. The latter was first described by Brandegee (1908) who noted that it was "a very distinct species, differing from the others of the genus in having alternate leaves and being glandular." He also called attention to the enlarged style branches and corollas which "are campanulate rather than tubular." Indeed, on an isotype of *B. glutinosa* (GH!), Brandegee appended a hand written notation, "*Biclavella glutinosa* Brandg.", as if he had contemplated the erection of a new genus, *Biclavella*, to accommodate the species. Nevertheless, B.L. Robinson (1911) retained the species, along with four others, in his revisionary treatment of *Barroetea*.

Barroetea glutinosa was maintained in *Barroetea* until King & Robinson (1972) transferred the species into their newly erected *Phanerostylis* (A. Gray)

King & H. Robins., a small genus of four or five species which was originally described as a subgenus within *Eupatorium* by A. Gray, but subsequently transferred to *Brickellia* by Turner (1978), following the suggestions of Harcombe & Beaman (1967). King & Robinson (1987), however, maintained all three genera: *Brickellia*, a large, mostly shrubby, desert group of about 100 species; *Barroetea* with six annual species; and *Phanerostylis*, except for the annual, *P. glutinosa*, a perennial, suffruticose or subshrubby group of four species. These several genera are accommodated next to each other in their treatment of the tribe Eupatorieae.

According to King & Robinson (1987), *Barroetea glutinosa* "has precisely those characters that were given by King & Robinson for *Phanerostylis*, distichous pappus barbulae, flaring corollas, rather large sinuous hairs on the basal stylar node, comparatively triangular and papillose corolla lobes, and densely papillose style branches." They maintain that these characters "are all foreign" to the genus *Barroetea*, especially the form of the corolla."

While most of their morphological observations regarding *Barroetea glutinosa* are valid, what they have not called to the fore are those characters which relate the species to *Barroetea* itself. Table 1 lists those characters which *B. glutinosa* shares with the three taxa, *Barroetea*, *Phanerostylis*, and *Brickellia* (sect. *Bulbostylis*). Casual examination of this listing will show that the species in question is closer to *Barroetea* in habit, capitulescence, and characters of the mature fruit; however, it appears closer to *Phanerostylis* in characters of the corolla and style. In short, all three genera are certainly closely related and should probably be positioned together, but it would appear that *Barroetea* and *Phanerostylis* are especially close. Indeed, *Barroetea glutinosa* appears to stand somewhere between *Barroetea* and *Phanerostylis*, but where? and how might these best be treated taxonomically?

The above taxonomic dilemma is not uncommon among the numerous genera recognized by King & Robinson (1987) in their monumental treatment of the closely knit tribe Eupatorieae. Most generic segregates of these authors have one or more species which are difficult to position because they stand somewhere between their neatly demarcated groupings. King & Robinson often recognize this themselves, but draw upon the belief that "intergeneric hybridization is common in the family [meaning tribe, we think]."

In any case, the senior author, in his preparation of a treatment of the Eupatorieae for México, is faced with several taxonomic options: 1.) to retain *Barroetea glutinosa*; 2.) position this in *Phanerostylis* as part of *Brickellia* but maintain *Barroetea*; or 3.) to merge all of *Barroetea* in an expanded subgenus *Phanerostylis* of *Brickellia*. While there are yet other taxonomic options, we view these as excessive. The purpose of the present paper, then, is to choose from among the several options posed above.

METHODS AND EXPERIMENTAL

Since much emphasis is placed upon the microfeatures of floral and fruit characteristics by King & Robinson (1987; Grashoff & Turner 1970), we documented the characteristics of achene, pappus, style, corolla, and leaves using scanning electron microscopy (SEM). Leaves and flowers were removed from herbarium specimens (Table 1), hydrated in a modified Hoyer's solution (3:1:1:10; Aerosol OT: Glycerin: Chloral hydrate: H_2O ; v:v:v:w), fixed in FAA solution, dehydrated by a graded ethanol series, and critical point dried. The dried samples were then mounted on a stub with double sided cellophane tape and vacuum coated with gold (25-35 nm thickness). The specimens were observed with a Phillips 515 SEM (10-20 KeV) and photographed using Polaroid Type 55 P/N film. For achene observation, mature seeds were soaked in 50% acetone, dehydrated through a graded acetone series and then dried at room temperature. Dusts on the seed surface were removed by 3-4 minutes of ultrasonification. The subsequent steps were the same as described for the preparation of leaf and flower materials.

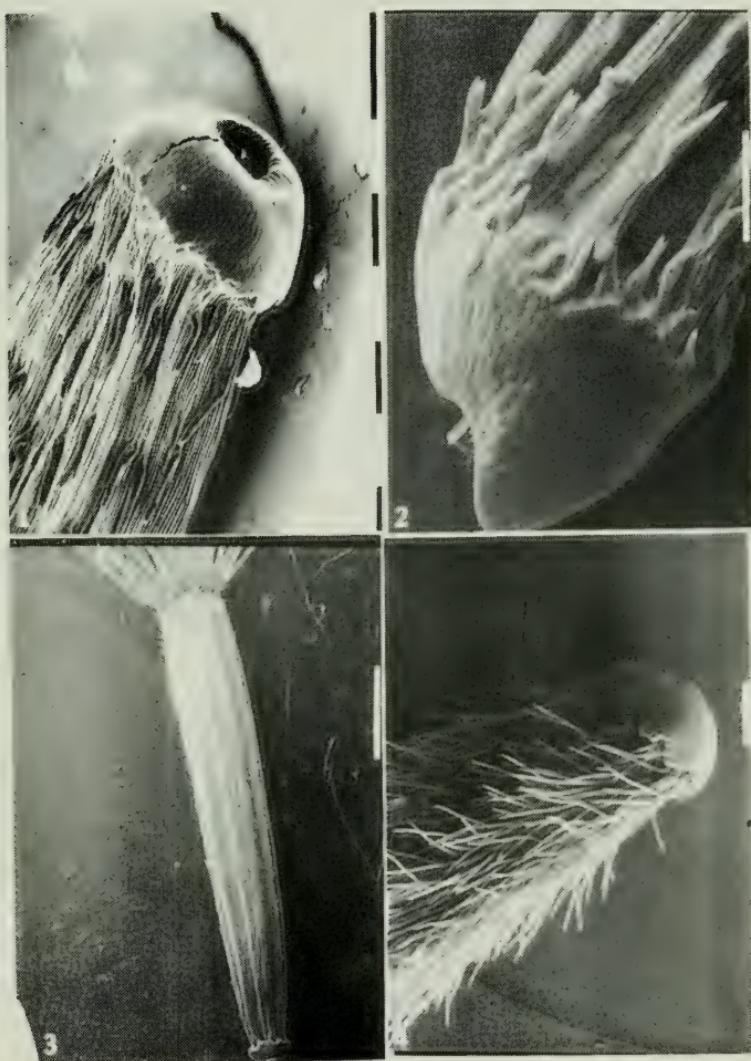
We have examined the following taxa, vouchers for which are given below in Table 2 (deposited in TEX). For convenience, except for *Barroetea glutinosa*, these are listed by their treatments in King & Robinson (1987).

RESULTS

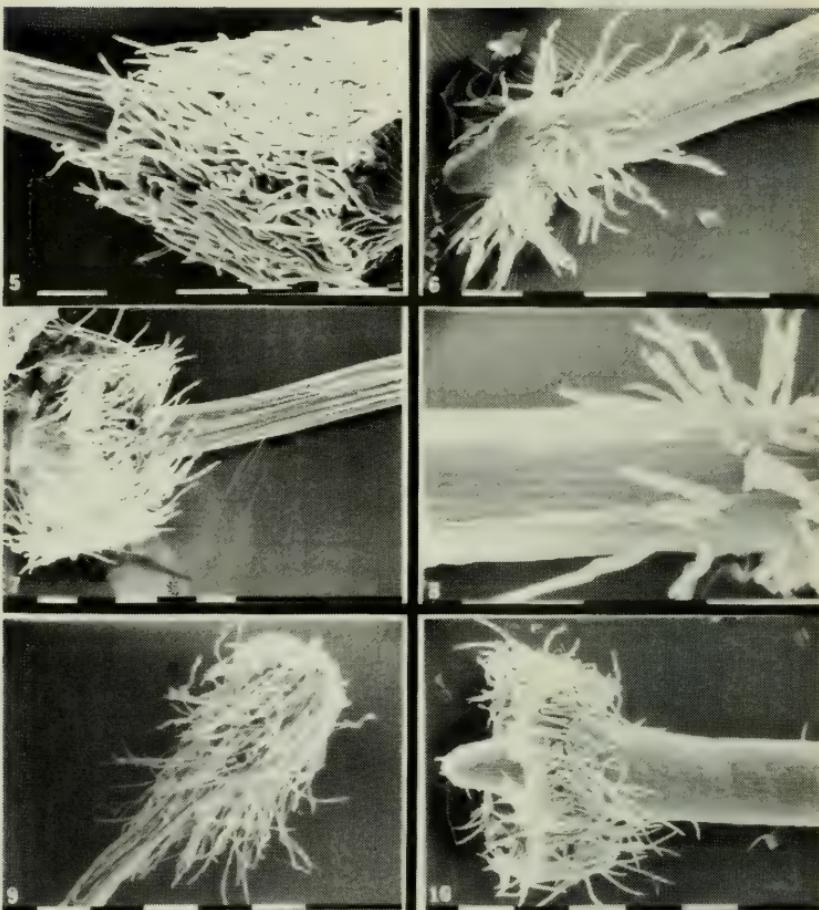
Achenes - The achenes of *Brickellia* (Fig. 23a, 23b) are characteristically columnar or prismatic, 4-5 sided; possess 8-9 pronounced ribs; and the exocarp is firmly fused to the achene, and does not normally peel, as is characteristic for *Barroetea* and *Phanerostylis*. The latter is also true for *Brickellia coulteri* and the annual, *Brickellia diffusa* both of which superficially resemble *Barroetea* in habit. *Phanerostylis* also has prismatic or columnar achenes, but these are mostly 4 or 5 ribbed, with achenal walls very much like those of *Barroetea* (Figs. 24b, 25b). Achenes of the latter, including *Barroetea glutinosa*, differ from those of *Phanerostylis* in being tangentially flattened with 4-5 major ribs (or with 8-10 ribs when intercalary ribbing occurs).

The carpopodium of all species of *Brickellia* examined were characteristically rather symmetrical and "stopper shaped" (Fig. 1-3), but occasional species such as *Brickellia veronicifolia* may have asymmetrical carpopodia (Fig. 4); carpopodia of *Phanerostylis* are similar but markedly asymmetrical, composed of thick walled cells, and from a side view much resemble the profile of an open jawed shark (Figs. 24, 25); those of *Barroetea*, including *Barroetea glutinosa*, differ from both of the aforementioned, in having a flattened carpopodium with thinner, less pronounced cells (Figs. 11, 14a, 20a, 21a, 22a).

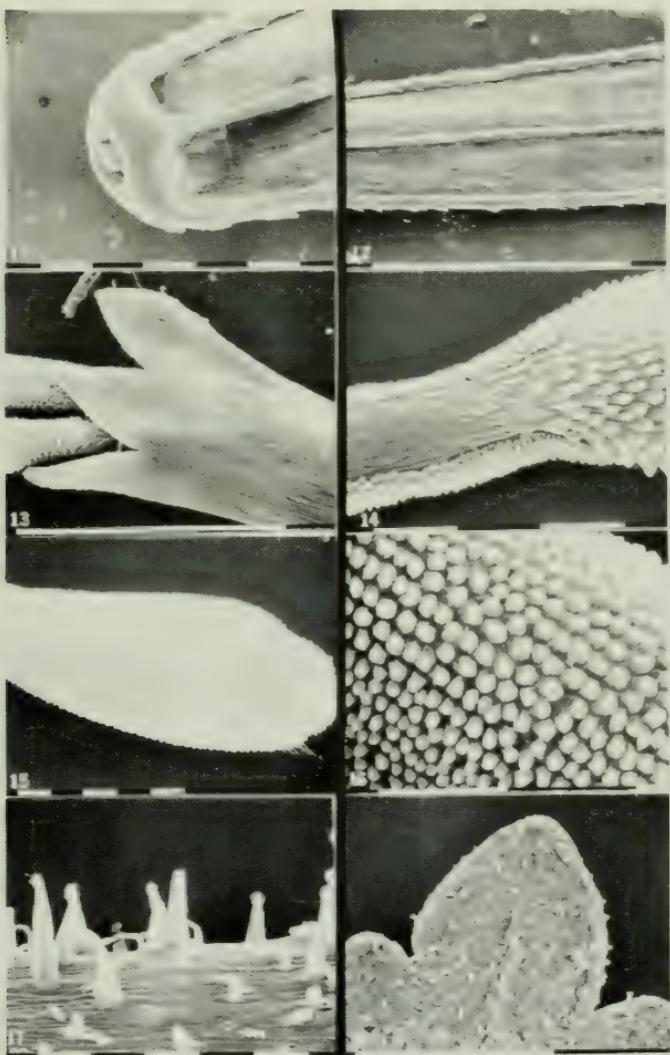
The pappus bristles found in *Brickellia* vary from nearly ebarbellate to plumose. The bristles of both *Phanerostylis* and *Barroetea* are mostly evenly



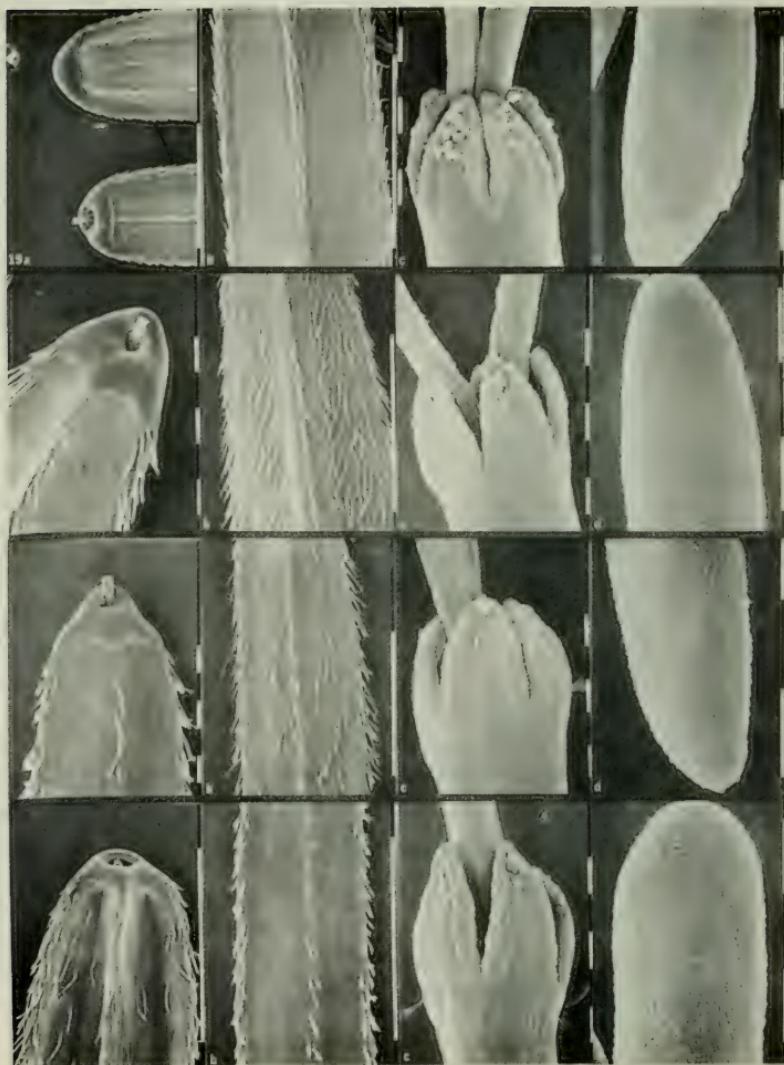
Figs. 1-4. Achenes of *Brickellia*, showing carpopodia - 1. *B. cordifolia*; 2. *B. coulteri*; 3. *B. lanata*; 4. *B. veronicifolia*. The size of the bar units shown for each figure is 0.5 cm except for the following: fig. 1, 1 cm.



Figs. 5-10. Basal stylar shafts showing pubescent nodes - 5. *Brickellia coulteri*; 6. *Brickellia (Phanerostylis) coahuilensis*; 7. *Brickellia (Phanerostylis) pedunculosa*; 8. *Barroetea glutinosa*; 9. *Barroetea glutinosa* (lower portion of shaft, basal node excluded); 10. *Brickellia sonorana* ined. The size of the bar units shown for each figure is 0.5 cm.



Figs. 11-18. Floral, vestiture, and leaf features of *Barroetea glutinosa* - 11. carpopodium; 12. midportion of adaxial surface of achene; 13. upper portion of corolla with protruding style branches; 14. upper portion of stigmatic lines, where these join the appendage; 15. apical portion of stylar appendages; 16. closeup of surface of Fig. 15; 17. glandular trichomes along stem; 18. apical portion of leaf. The size of the bar units shown for each figure is 0.5 cm except for the following: fig. 18, 1 cm; figs. 12 and 13, 2 cm.



Figs. 19-22. Fruit and floral details of Barroeteoid species of *Brickellia* (top to bottom: a. carpopodia, adaxial surfaces; b. midportion of achenes, adaxial surfaces; c. corolla lobes; d. stylar appendages) - 19. *B. sonorana* ined.; 20. *B. laxiflora*; 21. *B. subuligera*; 22. *B. pavonii*. The size of the bar units shown for each figure is 0.5 cm except for the following: figs. 19a, 19b, 20b, 21c, 22a, and 22b, bar = 2 cm.

Table 1. Comparison of *Barroetea glutinosa* with selected related taxa.

	<i>Barroetea</i>	<i>B. glutinosa</i>	<i>Phanerostylis</i>	<i>Brickellia coulteri</i> (Sect. <i>Bulbostylis</i>)
1.	annuals	annual	strong perennials	shrublets
2.	leaves setose	not setose	not setose	not setose
3.	leaves punctate	punctate	punctate or not	not punctate
4.	heads in cymules	in cymules	solitary	in cymules
5.	corolla tubular	flaring	flaring	tubular
6.	corolla lobes minute	large	large	minute
7.	style branches	a. broad, b. papillose	a. broad, b. papillose	a. narrow, b. smooth
8.	a. narrow b. smooth	gradually	gradually	abruptly
9.	shaft abruptly nodular	swollen	swollen	nodular
10.	pappus short ciliate or eciliate	long ciliate	long ciliate	variously ciliate
11.	pappus w/o cup	strong cup	strong cup	w/o cup
12.	achenes flat	achenes flat	4-5 sided	4-5 sided
13.	achenes with 6-8 ribs	3 ribbed	4-5 ribbed	8-10 ribbed
14.	carpopodium flattened	flattened	rounded	rounded symmetrical
	Achene outer surface peeling	peeling	peeling	not peeling

Table 2. Specimens and taxa examined by SEM for micromorphological features.

Taxon	Voucher
<i>Brickellia cordifolia</i> Ell.	Correll 10558
<i>Brickellia coulteri</i> A. Gray	Correll 30626
<i>Brickellia diffusa</i> (M. Vahl) A. Gray	King 3888
<i>Brickellia lanata</i> (DC.) A. Gray	Paray 3410
<i>Brickellia sonorana</i> ined.	Flyr 110
<i>Brickellia veronicifolia</i> (H.B.K.) A. Gray	Flyr 258
<i>Barroetea glutinosa</i> T. Brandegee	Tenorio 4751
<i>Barroetea pavonii</i> A. Gray	Sundberg 3029
<i>Barroetea laxiflora</i> (T. Brandegee) B. Turner	Lott 3409
<i>Barroetea subuligera</i> (Schauer) A. Gray	Sundberg 2821
<i>Phanerostylis coahuilensis</i> (A. Gray) King & H. Robins.	Lundell 5384
<i>Phanerostylis nesomii</i> (B. Turner) King & H. Robins.	Lavin 4888
<i>Phanerostylis pedunculosa</i> (DC.) King & H. Robins.	McVaugh 176

ebarbellate with fringed, apically acute hairs along the margins. Towards the apices of the bristles, the marginal hairs lose their neat arrangement, becoming contorted or twisted.

In summary, the achenes of *Barroetea* and *Phanerostylis* are very similar, those of the latter differing primarily in their columnar shape with relatively massive carpopodia. The achenes of *Barroetea glutinosa* resemble more closely those of *Barroetea* in that they are tangentially flattened with very similar carpopodia.

Corollas - The corolla lobes of *Barroetea* (s.s.) characteristically possess glandular hairs (Figs. 19, 20, 21, 22). Corollas of *Barroetea glutinosa* are eglandular (Fig. 13), like those of most species of *Brickellia* examined. In addition, the upper portion of the tube tends to flare in *Barroetea glutinosa*, much as in *Phanerostylis*; most species of *Brickellia*, however, tend not to flare, as is the case for all species of *Barroetea* (s.s.).

Styles - The base of the stylar shafts of *Barroetea*, *Brickellia*, and *Phanerostylis* are very similar in possessing pubescent nodes (Figs. 5-10). The nodes are not as pronounced in *Phanerostylis* and *Barroetea glutinosa* as they are in most species of *Brickellia* and *Barroetea*, but this appears to be more a matter of vestiture restriction than nodal size, the hairs of *Phanerostylis* and *Barroetea glutinosa* being more loosely arranged along the base of the shaft (Fig. 6-10).

The stylar appendages of *Barroetea glutinosa* (Figs. 14-16) are very similar to *Phanerostylis* (Figs. 24d, 25d), both possessing markedly papillate surfaces. Those of the remaining species of *Barroetea*, and those species of *Brickellia* examined, have relatively smooth surfaces (Fig. 19d, 21, 22, 23d).

In summary, the microfeatures of the corolla and styles of *Barroetea glutinosa* are more like those of the *Phanerostylis* group of *Brickellia* than they are to the genus *Barroetea* (s.s.), the latter having essentially the same features as those of typical *Brickellia*.

Vegetative features - The leaves of *Barroetea* (s.s.) differ from most species of *Brickellia*, *Phanerostylis*, and *Barroetea glutinosa* in possessing callous prickles at the leaf apex and upon the apices of denticulations along the margins of the blade. This character, taken alone, can be used to distinguish *Barroetea* (s.s.) from *Phanerostylis*. Nevertheless, *Barroetea glutinosa* does tend to develop a callosity at the apices of its leaves (and often on denticulations), but these do not form obvious prickles (Fig. 18). Thus, leaf morphology, as relates to callosity, remains ambiguous.

In its annual habit and branching aspect, *Barroetea glutinosa* is much more similar to *Barroetea* than it is to *Phanerostylis*, the latter being composed of few headed, often rhizomatous, perennials.

DISCUSSION

As can be seen by the comparison of characters given in Table 1, *Barroetea glutinosa* stands somewhere between *Barroetea* and *Phanerostylis*: floral and stylar characters suggest a close relationship with *Phanerostylis*, while achenal features and habit suggest a closer relationship with *Barroetea*. Both *Barroetea* and *Phanerostylis* appear closely related to *Brickellia*, so much so that some workers (Beaman & Harcombe 1967; Turner 1978; McVaugh 1984) have included *Phanerostylis* in *Brickellia*. So treated, it would be difficult to exclude *Barroetea* from *Brickellia* since *Barroetea glutinosa* marks the two taxa as sister groups.

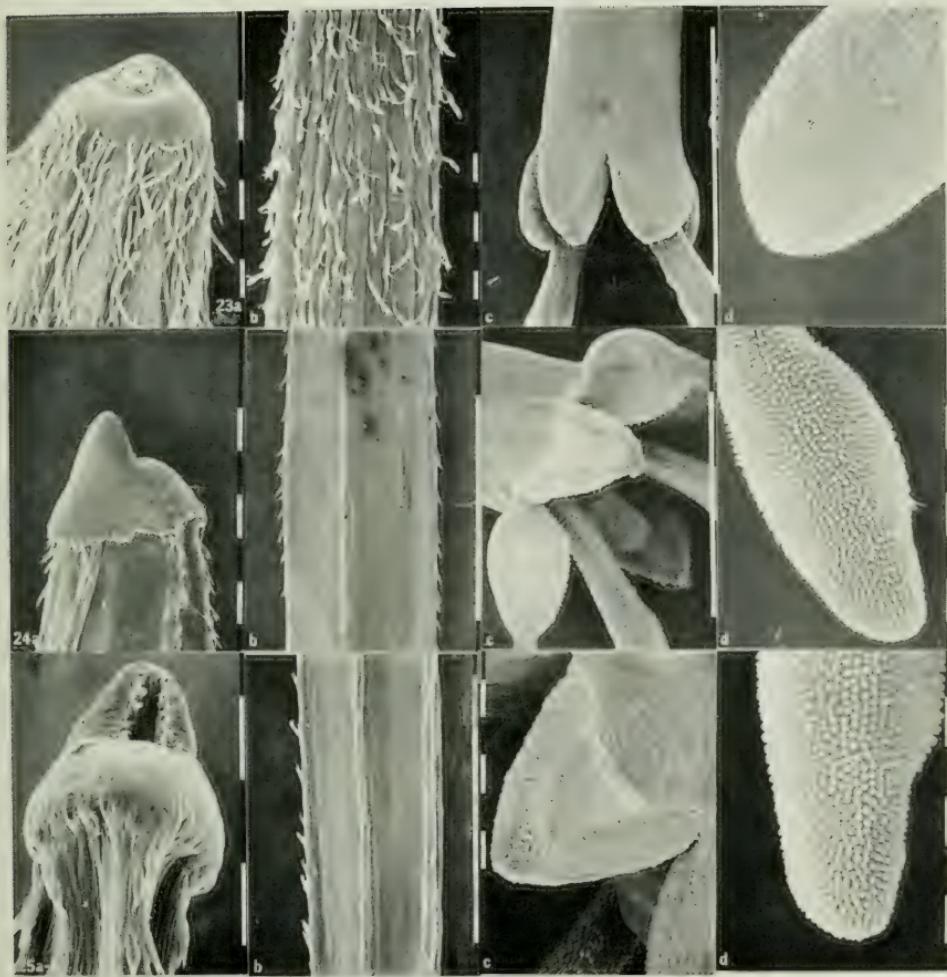
Barroetea, *Brickellia*, and *Phanerostylis* have base chromosome numbers of $x = 9$, share numerous similar microfeatures, and all are centered in mostly xeric habitats of central and northern México. Indeed, a preliminary cladistic analysis (Nesom & Turner, in prep.) of *Brickellia* (sensu King & Robinson), using the characters touted here, strongly suggests that *Barroetea* and *Phanerostylis* are readily imbedded within *Brickellia*, regardless of the position of *Barroetea glutinosa*. Thus, the generitype of *Brickellia* is a shrublet with flaring corollas, large corolla lobes, as in *Phanerostylis*; the style branches also flare as in the latter taxon, but their surfaces are essentially smooth, as in *Barroetea*. In short, the inclusion of *Barroetea* in the subgenus *Phanerostylis* within a broadly conceived *Brickellia* makes good phyletic sense, both on morphological and biogeographical grounds. The following nomenclature to accomplish this arrangement is proposed by the senior author:

Brickellia problematica B. Turner, *nom. nov.* Based upon *Barroetea glutinosa* T. Brandegee, *Zoe* 5:262. 1908. Not *Brickellia glutinosa* A. Gray, *Proc. Amer. Acad. Arts* 21:385. 1886.

Brickellia laxiflora (T. Brandegee) B. Turner, *comb. nov.* BASIONYM: *Barroetea laxiflora* T. Brandegee, *Univ. Calif. Publ. Bot.* 4:93. 1910. My concept of this taxon includes *Barroetea brevipes* B.L. Robins.

Brickellia pavonii (A. Gray) B. Turner, *comb. nov.* BASIONYM: *Barroetea pavonii* A. Gray, *Proc. Amer. Acad. Arts* 17:206. 1882. My concept of this taxon includes *Barroetea sessilifolia* Greenm.

Brickellia subuligera (Schauer) B. Turner, *comb. nov.* BASIONYM: *Bulbostylis subuligera* Schauer, *Linnaea* 19:718. 1847. My concept of this taxon would include *Barroetea setosa* A. Gray.



Figs. 23-25. Fruit and floral details of - 23. *Brickellia coulteri*; 24. *Brickellia (Phanerostylis) nesomii*; and 25. *Brickellia (Phanerostylis) coahuilensis* (a. carpopodium; b. midsection of achene, adaxial surface; c. corolla lobes; d. stylar appendages). The size of the bar units shown for each figure is 0.5 cm except for the following: figs. 23b, 23c, 24b, and 24c, bar = 2 cm.

ACKNOWLEDGMENTS

The SEM work for this paper was performed solely by the junior authors. The senior author conceived of the work, wrote the paper, and is responsible for the taxonomic judgments rendered. We are grateful to Dr. Guy Nesom and Dr. A.M. Powell for reviewing the paper.

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**BRICKELLIA SONORANA (ASTERACEAE), A NEW SPECIES FROM
MÉXICO BELONGING TO THE SUBGENUS PHANEROSTYLIS**

B. Turner

Department of Botany, University of Texas, Austin, Texas 78713 U.S.A.

ABSTRACT

A new annual species, *Brickellia sonorana* B. Turner, is described from Sonora, México. It belongs to the *Barroetea* complex of *Brickellia* and has been previously, but incorrectly, referred to as *Barroetea laxiflora* [= *Brickellia laxiflora* (T. Brandegee) B. Turner, the type from Puebla, México]. The Barroeteoid complex of *Brickellia* is composed of four closely related species: *B. sonorana*, *B. subuligera* (Schauer) B. Turner, *B. laxiflora* and *B. pavonii* (A. Gray) B. Turner. A key to these taxa is presented and a map showing their distributions is provided.

KEY WORDS: *Brickellia*, *Barroetea*, Eupatorieae, Asteraceae, México

Preparation of a treatment of *Barroetea* for the Asteraceae of México has convinced me that this genus, phyletically speaking, belongs under the taxonomic fabric of *Brickellia* (cf. Turner, *et al.* 1991). In connection with this study it has proved necessary to describe the following novelty.

***Brickellia sonorana* B. Turner, sp. nov.** TYPE: MÉXICO. Sonora: San Bernardo, Río Mayo, hill slope in short-tree forest, 21 Feb 1935, Howard Scott Gentry 1326 (HOLOTYPE: TEX!; Isotypes: ARIZ!, LL!).

Brickelliae laxiflorae (T. Brandegee) B. Turner similis sed capitulescentia laxa, pedunculis ultimis plerumque 2-6 cm longis (vs. 0.1-0.5 cm) differt.

Stiffly erect annual herbs 30-70 cm high, arising from rather small, shallow, tap roots. Stems terete, striate, densely puberulent to glabrate. Leaves opposite throughout, mostly 1.5-5.0 cm long, 1-3 cm wide; petioles 5-20 mm long; blades triangular to somewhat subcordate, trinervate from the base, sparsely to moderately puberulent, sparsely to densely glandular punctate beneath, the

margins serrate, ciliate, most of the serrations with callous, usually ciliate, appendages. Heads few to numerous, purplish, arranged in very lax leafy cymes or cymelike panicles, the ultimate peduncles mostly 2-5(7) cm long. Involucres mostly 8-10 mm high, the bracts 4-8 seriate, graduate, linear-lanceolate, 2-5 striate, puberulent to glabrous, the apices narrowly acute to apiculate. Receptacle plane, epaleate. Florets 15-21, the corollas tubular, purplish above, ca. 5 mm long, the lobes 5, ca. 0.5 mm long, usually with 1 or more sessile glandular hairs. Style branches with linear-ob lanceolate purplish appendages which are essentially smooth at magnification of 20x. Achenes tangentially flattened, the abaxial surface with a single principal nerve, the adaxial surface with 3 principal nerves (lesser nerves sometimes intercalated between the principal nerves on the abaxial surface); pappus of 20-25 sparsely barbellate bristles 4-6 mm long.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Sinaloa: Culiacán, 14 Nov (w/o year), Brandegee s.n. (UC); 23 mi N of Culiacán, 28 Jan 1964, Flyr 110 (TEX); 4 mi S of turnoff to La Cruz on México highway 15, 29 Jan 1964, Flyr 121 (TEX); Imala, 20 Nov 1939, Gentry 5001 (ARIZ); Cerro Colorado, 4 Feb 1940, Gentry 5485 (ARIZ); Cerro Tecomate, 29 Feb 1940, Gentry 5765 (ARIZ); 59 mi N of Culiacán, 22 Dec 1971, Norris, et al. 20113 (LL). Sonora: SW edge of Alamos, 22 Sep 1973, Fish 134 (TEX); Canyon Sapopa, Río Mayo, 15 Oct 1934, Gentry 1040 (F); Río Mayo, 21 Feb 1935, Gentry 1326 (ARIZ); Alamos, 16 Oct 1936, Gentry 2923 (ARIZ); Sierra Alamos, 3 Nov 1939, Gentry 4864 (ARIZ); 109° 19' x 28° 16', 26 Mar 1983, Sanders 3697 (ARIZ); Sierra Alamos, 30 Dec 1983, Van Devender 83-119 (ARIZ, TEX).

This taxon was included within *Barroetea laxiflora* T. Brandegee by Robinson (1911) in his revision of *Barroetea*. That name, however, is typified by *Purpus* 4128 (HOLOTYPE: UC!) from Coxcatlán, Puebla, a markedly different taxon with a lax capitulecence of congested heads and having cordate leaves with more numerous serrations. I have transferred this species and related taxa to *Brickellia* (Turner, et al. 1991).

A key to the Barroeteoid species of *Brickellia*, along with complete synonymy and a map showing distributions are presented below.

KEY TO SPECIES OF THE BARROETEA COMPLEX OF BRICKELLIA

1. Stems with glandular trichomes; denticulations of leaves not setose. *B. problematica*
1. Stems glabrous or puberulent, without glandular trichomes; denticulations of leaves setose. (2)
 2. Leaves sessile or nearly so. *B. pavonii*
 2. Leaves with petioles mostly 3-30 mm long. (3)

3. Peduncles of individual heads mostly 2-6 cm long; Son, Sin. *B. sonorana*
3. Peduncles of individual heads mostly 0-2 cm long; widespread. (4)
 4. Achenes with 1-2(3) well developed ribs on adaxial faces; florets 15-27 per head; midstem leaves with petioles 1-3 cm long; se Pue, Oax. *B. laxiflora*
 4. Achenes without well developed ribs on adaxial faces; florets 30-50 per head; midstem leaves with petioles 0.5-1.0 cm long; widespread. *B. subuligera*

Brickellia laxiflora (T. Brandegee) B. Turner, Phytologia 71(1):48. 1991.
BASIONYM: *Barroetea laxiflora* T. Brandegee, Univ. Calif. Publ. Bot 4:93. 1910. TYPE: MÉXICO. Puebla: Coxcatlán, Sep 1909, C.A. Purpus 4128 (HOLOTYPE: UC!).

Barroetea brevipes B.L. Robins., Proc. Amer. Acad. Arts 47:205. 1911.
TYPE: MÉXICO. Oaxaca: Valley of Cd. Oaxaca, 5200-6800 ft, 2 Oct 1894 (HOLOTYPE: GH!; Isotype: US!).

As indicated in Fig. 1, this species is found in central Veracruz, southern Puebla and northern Oaxaca, mostly occurring from 500-1500 m, and flowering from October-November.

Robinson distinguished *Barroetea brevipes* from *B. laxiflora* by its reportedly subsessile heads arranged in rather laxly branched panicles, but branching patterns of the capitulescence in *B. laxiflora* is very variable, as evident from the ten or more collections of this taxon (LL, TEX) examined by the present author, most of these relatively recent collections.

Chromosome number, $2n = 18$.

Brickellia pavonii (A. Gray) B. Turner, Phytologia 71(1):48. 1991. BASIONYM: *Barroetea pavonii* A. Gray, Proc. Amer. Acad. Arts 17:206. 1882. TYPE: MÉXICO. w/o locality, 1787-1804, M-Pavon Herb., Sesse, et al. s.n. (numbered 1499 and labeled "Eupatorium setigerum;" Photoholotype: F!, TEX!). Gray also cited a collection in the Pavon herbarium annotated as "Eupatorium cuspidatum," which is numbered 4053 (photograph F!, TEX!). Both sheets bear plants with sessile leaves and clearly belong to the same taxon.

Brickellia pavonii is a commonly encountered weedy species, largely confined to tropical deciduous forests of southcentral México (Fig. 1), occurring from near sea level to about 2200 meters, flowering from October-November. Numerous collections are on deposit at LL and TEX.

Chromosome number, $2n = 18$ (Sundberg 2971, TEX).

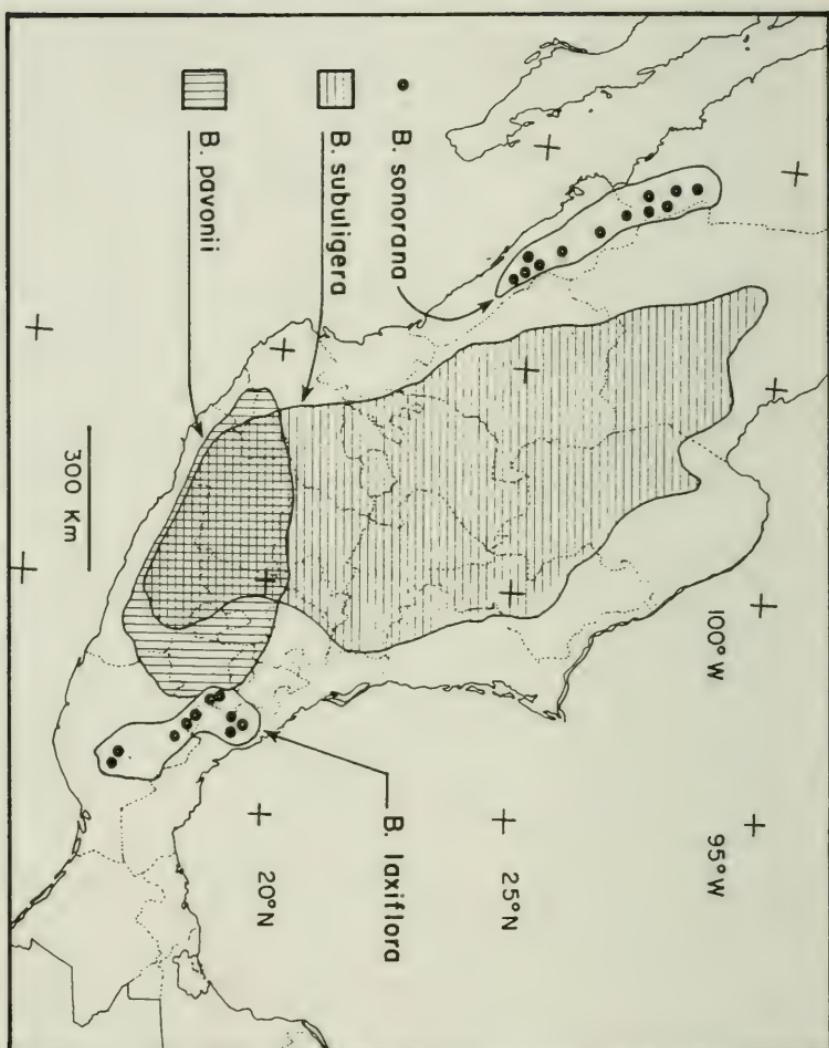


Figure 1. Distribution of the Barroeteoid species of *Brickellia*.

Brickellia problematica B. Turner, Phytologia 71(1):48. 1991. Based upon *Barroetea glutinosa* T. Brandegee, Zoe 5:262. 1908. Not *Brickellia glutinosa* A. Gray, Proc. Amer. Acad. Arts 21:385. 1886.

This species was originally described as *Barroetea glutinosa* and complete synonymy is given in Turner, *et al.* (1991).

Brickellia problematica is largely confined to southernmost Puebla (Fig. 1) and adjacent northern Oaxaca where it occurs in relatively xeric woodlands dominated by species of *Juniperus*, *Eysenhardtia*, *Montanoa*, *Croton*, *Agave*, etc., occurring mostly from 1800-2400 m; flowering from August to November. While originally thought to be rare, recent collections (seven or more) show the species to be locally common in the mountainous areas about Caltepec, Puebla and elsewhere in this region, depending upon rains.

Brickellia subuligera (S. Schauer) B. Turner, Phytologia 71(1):48. 1991. BASIONYM: *Bulbostylis subuligera* S. Schauer, Linnaea 19:718. 1847. *Barroetea subuligera* (S. Schauer) A. Gray, Proc. Amer. Acad. Arts 15:29. 1879. TYPE: MÉXICO. Hidalgo: Zimapán, w/o date, Aschenborn 260 (HOLOTYPE: B, destroyed?; Isotype: P, according to McVaugh [1984]).

Barroetea setosa A. Gray, Proc. Amer. Acad. Arts 15:29. 1879. TYPE: MÉXICO. San Luis Potosí: mountains southeast of the city of San Luis Potosí, 1830-2440 m, Jan-Feb 1878, Parry & Palmer 353 (HOLOTYPE: GH!).

Barroetea subuligera (S. Schauer) A. Gray var. *latisquamea* Greenm., Proc. Amer. Acad. Arts 40:35. 1904. TYPE: MÉXICO. Jalisco: hills above Etzatlán, 27 Oct 1903, C.G. Pringle 8773 (HOLOTYPE: MO; Isotypes: LL-[2]!).

This is by far the most widespread variable species within the *Barroetea* complex, occurring mostly on the Central Plateau of México in dry deciduous forests from 500-2000 m; flowering from September-January.

Chromosome number, $2n = 18$ (*Barrie 1106*, TEX).

ACKNOWLEDGMENTS

I am grateful to Dr. Guy Nesom for the Latin diagnosis, and to him and Dr. A.M. Powell for reviewing the paper.

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Phytologia (July 1991) 71(1):56.

**NEW NAME FOR *SENECIO GESNERIFOLIUS* TURNER (SENECIONAE,
ASTERACEAE)**

B.L. Turner

Department of Botany, University of Texas, Austin, Texas 78713 U.S.A.

ABSTRACT

Senecio mezquitalanus Turner is provided as a replacement for *S. gesnerifolius* B. Turner which is a later homonym of *S. gesnerifolius* Cuatrecasas.

KEY WORDS: *Senecio*, Senecioneae, Asteraceae, nomenclature

Senecio mezquitalanus B. Turner, *nom. nov.*, a new name for *S. gesnerifolius* B. Turner. BASIONYM: *Senecio gesnerifolius* B. Turner, Phytologia 62:75. 1987. Not *Senecio gesnerifolius* Cuatrecasas, Fieldiana Bot. 27:33. 1950.

ACKNOWLEDGMENTS

I am grateful to Dr. C. Jeffery of KEW for calling the above oversight to my attention. He also informs me that he intends to position the species concerned under the genus *Roldana* H. Robins. & Brett.

A NEW COMBINATION IN BROMELIACEAE

L.B. Smith

Department of Botany, Smithsonian Institution, Washington, D.C. 20560
U.S.A.

ABSTRACT

New nomenclature in a genus of Bromeliaceae is presented.

KEY WORDS: Bromeliaceae, Neotropics, nomenclature

When on 16 October 1990, I cited new combinations for *Podaechmea* and *Platyaechmea* and their attendant species, I gave only the name and forgot the full reference until Michael J. Warnock kindly supplied me with all but the following reference:

Platyaechmea fasciata (Lindley) Smith & Kress var. *purpurea* (Guillon)
L.B. Smith. BASIONYM: *Billbergia rhodocyannea* Lemaire var. *purpurea*
Guillon, Rev. Hort. 53:453. 1883.

LITERATURE CITED

- Smith, L.B. & R.J. Downs. 1979. Bromeloideae (Bromeliaceae), Flora Neotropica Monograph 14(3), Organization for Flora Neotropica, New York.
- Smith, L.B. & W.J. Kress. 1989. New or restored genera of Bromeliaceae. *Phytologia* 66(1):70-79.
- _____. 1990. New genera of Bromeliaceae. *Phytologia* 69(4):271-274.

NOMENCLATURAL NOTES FOR THE NORTH AMERICAN FLORA. VI

John T. Kartesz & Kancheepuram N. Gandhi

The North Carolina Botanical Garden, Dept. of Biology, Coker Hall,
University of North Carolina, Chapel Hill, North Carolina 27599-3280, U.S.A.

ABSTRACT

The following new combinations are proposed: *Artemisia tridentata* Nutt. ssp. *spiciformis* (Osterhout) Kartesz & Gandhi; *Cistanthe parryi* (A. Gray) Hershkovitz var. *arizonica* (J.T. Howell) Kartesz & Gandhi; *Cistanthe parryi* var. *hesseae* (Thomas) Kartesz & Gandhi; *Cistanthe parryi* var. *nevadensis* (J.T. Howell) Kartesz & Gandhi; and *Cistanthe umbellata* (Torr.) Hershkovitz var. *caudicifera* (A. Gray) Kartesz & Gandhi. *Oonopsis foliosa* E. Greene var. *monocephala* (A. Nels.) Kartesz & Gandhi; *Pyrrocoma carthamoides* Hook. var. *cusickii* (A. Gray) Kartesz & Gandhi; *Pyrrocoma hirta* (A. Gray) E. Greene var. *sonchifolia* (E. Greene) Kartesz & Gandhi; *Pyrrocoma linearis* (Keck) Kartesz & Gandhi; *Pyrrocoma lucida* (Keck) Kartesz & Gandhi; *Pyrrocoma racemosa* (Nutt.) Torr. & Gray var. *pinetorum* (Keck) Kartesz & Gandhi; *Pyrrocoma racemosa* var. *paniculata* (Nutt.) Kartesz & Gandhi; *Pyrrocoma uniflora* (Hook.) E. Greene var. *gossypina* (E. Greene) Kartesz & Gandhi; *Solidago simplex* Kunth ssp. var. *randii* (Porter) Kartesz & Gandhi; *Stenotus acaulis* (Nutt.) Nutt. var. *glabratus* (D.C. Eat.) Kartesz & Gandhi; and *Stenotus armerioides* Nutt. var. *gramineus* (Welsh & F.G. Sm.) Kartesz & Gandhi.

KEY WORDS: Floristics, nomenclature, Asteraceae, Portulacaceae, *Artemisia*, *Cistanthe*, *Oonopsis*, *Pyrrocoma*, *Solidago*, and *Stenotus*

INTRODUCTION

Continuing with the "NOMENCLATURAL NOTES FOR THE NORTH AMERICAN FLORA" (Kartesz & Gandhi 1989, 1990a, 1990b, 1990c, 1991), a sixth note in the series is presented here toward advancing our understanding of North American plant names. The data pertaining to type specimens, mentioned in this article, were collected from literature.

ASTERACEAE

Artemisia tridentata ssp. *spiciformis*

In Goodrich, *et al.* (1985), the combination *Artemisia tridentata* Nutt. ssp. *spiciformis* (Osterhout) Goodrich & McArthur, which was based on *A. spiciformis* Osterhout, was proposed in the abstract section of that work. Goodrich, *et al.* used this trinomial in the text and provided a reference (in the literature cited section of their work) to the place of publication of the basionym as: "Osterhout, G.E., 1900. New plants from Colorado. Bull. Torrey Bot. Club 27:506-508." Since the basionym actually appeared on p. 507, and since a page reference must be the page or pages on which the basionym was validly published, but not to the pagination of the whole publication (ICBN Art. 33.2, footnote 1), the new combination remains invalid. The invalidity of their new combination was indicated by Chapman (Taxon 35:767. 1986) and by the Special Committee on valid publication (Taxon 35:768. 1986). Although basionym publication details were provided by Chapman and by the Special Committee, neither indicated the acceptance of this trinomial; hence, the combination must not be attributed to any of them (Art. 34.1a). We accept the trinomial and provide the complete bibliography to validate the new combination.

Artemisia tridentata Nutt. ssp. *spiciformis* (Osterhout) Kartesz & Gandhi,
comb. & stat. nov. BASIONYM: *Artemisia spiciformis* Osterhout, Bull.
Torrey Bot. Club 27:507. 1900. TYPE: U.S.A. Colorado: Larimer Co.,
North Park, 3 Sep 1899, *Osterhout 2011* (?RM).

Oonopsis, *Pyrrocoma*, and *Stenotus*

The historical treatment and application of the *Haplopappus* Cass. complex has varied widely among North American authors. Lane, *et al.* (1987) considered *Haplopappus* sensu Hall to be an artificial genus. The complex has been viewed to represent a single genus (Torrey & Gray 1842; Hall 1928), two genera, i.e., *Haplopappus* and *Machaeranthera* Nees (Cronquist & Keck 1957; Munz & Keck 1973), or many genera (Rydberg 1906; Correll & Johnston 1970; Turner & Hartman 1976; Clark 1979; Brown & Clark 1982; Turner & Sundberg 1986; Nesom 1989a, 1990; Nesom & Morgan 1990; Nesom, *et al.* 1990). The authors of the third category restrict the application of *Haplopappus* to South America. Nesom & Morgan provided a synopsis of the complex accounting for all sections of North American *Haplopappus* sensu Hall and their current placement. For the North American flora (north of México), we do not recognize *Haplopappus*. The taxa, previously known as *Haplopappus* in the U.S.A., are assigned to the following genera: *Croptilon* Raf., *Ericameria* Nutt., *Hazardia* E. Greene, *Hesperodoris* E. Greene, *Isocoma* Nutt., *Machaeranthera* Nees, *Oonopsis* Nutt., *Prionopsis* Nutt., *Pyrrocoma* Hook., *Stenotus* Nutt., *Tonestus* A. Nels., and *Xylothamia* Nesom, *et al.* The recognition of the above

genera necessitates several new combinations. We propose new combinations in *Oonopsis*, *Pyrrocoma*, and *Stenotus*.

Note: Dr. R.A. Mayes (1976), in his Ph.D. dissertation (TEX), proposed several new combinations in *Pyrrocoma* at infraspecific ranks. To date, his new combinations remain unpublished and therefore invalid. Our attempts to locate Dr. Mayes have been unsuccessful. Since we plan to use five of his new combinations (*), we considered publishing them on his behalf. But such a publication requires his approval; hence, we reluctantly propose them here along with our own.

***Oonopsis foliosa* E. Greene var. *monocephala* (A. Nels.) Kartesz & Gandhi,
comb. & stat. nov.** BASIONYM: *Oonopsis monocephala* A. Nels., Bot.
Gaz. (Crawfordsville) 31:399. 1901. TYPE: U.S.A. Colorado: 1900,
Archibald 257.

***Pyrrocoma carthamoides* Hook. var. *cusickii* (A. Gray) Kartesz & Gandhi,
comb. nov. (*)**. BASIONYM: *Haplopappus carthamoides* (Hook.) A.
Gray var. *cusickii* A. Gray, Syn. Fl. 1(2):126. 1884. TYPE: U.S.A.
Oregon: Union Co., Jun 1877, *Cusick* 445 (GH).

***Pyrrocoma hirta* (A. Gray) E. Greene var. *sonchifolia* (E. Greene) Kartesz
& Gandhi, comb. & stat. nov. (*)**. BASIONYM: *Pyrrocoma sonchifolia* E.
Greene, Leafl. Bot. Observ. Crit. 2:18. 1909. TYPE: U.S.A.
Washington: Yakima Co., 1882, *Brandegee* 111 (US).

***Pyrrocoma linearis* (Keck) Kartesz & Gandhi; comb. & stat. nov.** BA-
SIONYM: *Haplopappus uniflorus* Hook. ssp. *linearis* Keck, Aliso 4:103.
1958. TYPE: U.S.A. Idaho: Owyhee Co., 17 Jun 1943, *Christ* 14081
(NY).

Note: The grasslike leaves (linear and entire) of *Pyrrocoma linearis* warrant specific recognition from *P. uniflora* (Hook.) E. Greene, which has lanceolate or oblanceolate leaves with dentate margins.

***Pyrrocoma lucida* (Keck) Kartesz & Gandhi, comb. nov. (*)**. BASIONYM:
Haplopappus racemosus Nutt. ssp. *lucidus* Keck, Madroño 5:167. 1940.
Haplopappus lucidus (Keck) Keck, Aliso 4:103. 1958. TYPE: U.S.A.
California: Plumas Co., 9 Aug 1938, *Keck* 4897 (CAS); Isotype: CAS.

Note: Although Keck did not justify elevating *Haplopappus racemosus* ssp. *lucidus* to *H. lucidus*, we assert that the latter taxon with its glandular nature and acuminate-caudate phyllaries is distinct from the former (usually eglandular; phyllaries obtuse-acute).

Pyrrocoma racemosa (Nutt.) Torr. & Gray var. **paniculata** (Nutt.) Kartesz & Gandhi, *comb. nov.* BASIONYM: *Homopappus paniculatus* Nutt., Trans. Amer. Philos. Soc. II. 7:331. 1840. *Haplopappus paniculatus* (Nutt.) A. Gray var. *paniculatus* (automatically created by *Haplopappus paniculatus* var. *virgatus* A. Gray). TYPE: U.S.A. Oregon: Union Co., 1836, *Nuttall s.n.* (BM).

Haplopappus paniculatus (Nutt.) A. Gray var. *virgatus* A. Gray, Proc. Amer. Acad. Arts 7:354. 1868. TYPE: U.S.A. California: Mono Co., *Bolander 6168* (GH).

Pyrrocoma racemosa (Nutt.) Torr. & Gray var. **pinetorum** (Keck) Kartesz & Gandhi, *comb. & stat. nov. (*)*. BASIONYM: *Haplopappus racemosus* (Nutt.) Torr. & Gray ssp. *pinetorum* Keck, Madroño 5:166. 1940. TYPE: U.S.A. California: Siskiyou Co., 8 Aug 1938, *Keck 4862* (CAS).

Pyrrocoma uniflora (Hook.) E. Greene var. **gossypina** (E. Greene) Kartesz & Gandhi, *comb. & stat. nov. (*)*. BASIONYM: *Pyrrocoma gossypina* E. Greene, Pittonia 3:23. 1898. TYPE: U.S.A. California: San Bernardino Co., Aug 1882, *Parish 1558* (US).

Stenotus acaulis (Nutt.) Nutt. var. **glabratus** (D.C. Eat.) Kartesz & Gandhi, *comb. nov.* BASIONYM: *Haplopappus acaulis* (Nutt.) A. Gray *glabratus* D.C. Eat. in S. Watson, Botany [fortieth parallel] 161. 1871. *Chrysopsis caespitosus* Nutt., J. Acad. Nat. Sci. Philadelphia 7:33. 1834. *Stenotus caespitosus* (Nutt.) Nutt., Trans. Amer. Philos. Soc. II. 7:334. 1841. TYPE: U.S.A. Missouri River (PH; fiche!).

Stenotus armerioides Nutt. var. **gramineus** (Welsh & F.G. Sm.) Kartesz & Gandhi, *comb. nov.* BASIONYM: *Haplopappus armerioides* (Nutt.) A. Gray var. *gramineus* Welsh & F.G. Sm., Great Basin Naturalist 43:371. 1982. TYPE: U.S.A. Utah: Uintah Co., 29 May 1982, *Thorne & Neely 1836* (BRY); Isotypes: NY, CAS.

Solidago simplex var. *randii*

Nesom (1989b) reported that *Solidago glutinosa* Nutt. (Trans. Amer. Philos. Soc. II. 7:328. 1841) and *S. simplex* Kunth (*in H.B.K., Nov. Gen. et Sp. 4:163. 1820*) are conspecific. In *S. simplex*, Ringius (*in Ringius & Semple 1991*) made seven new combinations including *S. simplex* ssp. *randii* (Porter) Ringius. Since we recognize the preceding taxon at varietal rank, a new combination is proposed below.

Solidago simplex Kunth var. **randii** (Porter) Kartesz & Gandhi, *ssp. et var. comb. nov.* BASIONYM: *Solidago virgaurea* L. var. *randii* Porter,

Bull. Torrey Bot. Club 20:208. 1893. *Solidago glutinosa* Nutt. ssp. *randii* (Porter) Cronq., Rhodora 49:77. 1947. *Solidago glutinosa* Nutt. var. *randii* (Porter) Cronq., Rhodora 49:77. 1947. *Solidago glutinosa* Nutt. ssp. *randii* (Porter) Ringius, Phytologia 70:397. 1991. LECTOTYPE (*vide* Ringius, Taxon 36:156. 1987): U.S.A. Maine: Mt. Desert Island, 30 Aug 1892, *Rand* s.n. (NY).

PORTULACACEAE

We accept Hershkovitz' (1990) segregation of the genus *Cistanthe* Spach from the genus *Calandrinia* Kunth and his inclusion of the genus *Calyptridium* Nutt. in *Cistanthe*. Four additional new combinations are required and made below.

***Cistanthe parryi* (A. Gray) Hershkovitz var. *arizonica* (J.T. Howell) Kartesz & Gandhi, *comb. nov.* BASIONYM: *Calyptridium parryi* A. Gray var. *arizonicum* J.T. Howell, Leafl. West. Bot. 4:215. 1945. TYPE: U.S.A. Arizona: Pima Co., Hills above Rosemont, 13 Mar-23 Apr 1903, *Griffiths* (US).**

***Cistanthe parryi* (A. Gray) Hershkovitz var. *hesseae* (Thomas) Kartesz & Gandhi, *comb. nov.* BASIONYM: *Calyptridium parryi* A. Gray var. *hesseae* Thomas, Leafl. West. Bot. 8:10. 1956. TYPE: U.S.A. California: Santa Cruz Co., Ben Lomond Mountains, 2 Jul 1954, *Hesse* 1317 (CAS).**

***Cistanthe parryi* (A. Gray) Hershkovitz var. *nevadensis* (J.T. Howell) Kartesz & Gandhi, *comb. nov.* BASIONYM: *Calyptridium parryi* A. Gray var. *nevadense* J.T. Howell, Leafl. West. Bot. 4:216. 1945. TYPE: U.S.A. Nevada: Gold Mt., 23 Jun 1930, *Keck* 559 (CAS).**

***Cistanthe umbellata* (Torr.) var. *caudicifera* (A. Gray) Kartesz & Gandhi, *comb. nov.* BASIONYM: *Spraguea umbellata* Torr. var. *caudicifera* A. Gray (*in* Patterson, *Numb. Checkl. N. Amer. Pl.* 14. 1892, *nom. nud.*). *Syn. Fl.* 1:278. 1897. *Calyptridium umbellatum* (Torr.) E. Greene var. *caudiciferum* (A. Gray) Jepson, *Fl. Calif.* 1:465. 1914.**

Note: Typification of Gray's trinomial is under our investigation.

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NOTES ON BROMELIACEAE, XLII

Lyman B. Smith

United States National Museum, Washington, D.C. 20560 U.S.A.

ABSTRACT

A supplement to the treatment of *Pitcairnia* in Flora Neotropical Monographs 14(1) is provided. Descriptions and illustrations are published for species of Neotropical *Pitcairnia* described since the publication of Flora Neotropica Monographs 14(1).

KEY WORDS: *Pitcairnia*, Bromeliaceae, taxonomy, Neotropics

1. PITCAIRNIOIDEAE 8. PITCAIRNIA

In 1974 Robert Jack Downs and I published the Pitcairnioideae in Flora Neotropica Monograph no. 14(1) including *Pitcairnia*. To its 260 species, about 100 have since been added. In conjunction with others, I plan to prepare a combined key with references to the numeric designations for each species in Flora Neotropica. Numeric references (e.g., 214.1) to added species will allow proper placement of each additional species in the Flora Neotropical treatment. Each added species listing includes a copy of the original description or its translation. Additional, previously undescribed species are here published, and included in the present listing.

This series is part of a plan to publish revisions of all the genera without regard to order and as specialists volunteer. So far we have prepared manuscripts of *Puya* and published *Encholirium*, (Bradea 5, no. 27:291. 1989 with 31 species).

- 75.2. *Pitcairnia arida* L.B. Smith & J. Betancur, *sp. nov.* COLOMBIA.
Antioquia: Municipio Hispania, 8 km from Remolinos to Andes, Western Cordillera, east slope, Canyon of the Río Cauca, a narrow very dry and rocky gully by the road, bs-T, 900 m alt., 5° 48.9' north latitude, 75° 54.33' west longitude, 26.VII.1988, J. Betancur, R. Fonnegra, F.J. Roldán, & H. Ortiz 606 (HOLOTYPE: US; Isotype: HUA).

A *P. haughtii* L.B. Smith, cui verisimiliter affinis, petiolis serratis, inflorescentia multo ramosiore, floribus divergentibus differt.

PLANT caespitose, flowering 275 cm high (! J. Betancur). LEAVES fasciculate, all alike, 1.6 m long, densely farinose beneath; sheaths suborbicular, 6 cm broad, apically dark castaneous, lustrous; blades linear-lanceolate, attenuate, 38 mm wide, entire; petioles 12 mm wide, laxly spinose-serrate. SCAPE erect, stout, over 12 mm thick near base, densely farinose; scape bracts subfoliaceous basally, very narrowly triangular and long attenuate above, much exceeding the internodes, 85 cm long, chartaceous. INFLORESCENCE laxly paniculate, 77 cm long, densely farinose except the petals; primary bracts like the upper scape bracts, shorter than the sterile bases of the long divergent branches. FLORAL BRACTS narrowly ovate, attenuate, equaling or exceeding the slender terete 12 mm long pedicels. SEPALS linear-lanceolate, acute, 40 mm long, the posterior ones carinate; petals naked, roseate with pale apices. Pl. 1.

81.1. ***Pitcairnia explosiva* L.B. Smith & J. Betancur, sp. nov.** COLOMBIA. Antioquia: Municipio Salgar, 11 km on the road between Salgar and Bolombolo, very moist rocky gully, 900 m. alt., mouth of the Río Barroso, 5° 55' north latitude, 1.X.1987, Julio Betancur, J. Zaruchi, & A. Brant 518 (HOLOTYPE: US; Isotype: HUA).

A *P. diffusa* L.B. Smith, cui valde affinis, foliorum laminis linear-lanceolatis, petiolis spinoso-serratis differt.

PLANT flowering 175 cm high (! J. Betancur), stem short. LEAVES rosulate, all alike, 95 cm long (! J. Betancur); sheaths ovate, ca. 7 cm long, dark castaneous, densely white lepidote; blades linear-lanceolate, attenuate, 3 cm wide, entire or obscurely denticulate, white lepidote beneath, glabrous above; petioles 1 cm wide, laxly spinose-serrulate. SCAPE terete, 8 mm thick at apex, white lepidote becoming glabrescent upward; scape bracts erect, long-filiform-laminate from an ovate base, much longer than the internodes but exposing most of the scape, white lepidote to glabrescent. INFLORESCENCE extremely diffuse, tripinnate, glabrous except for the bases of the flowers; primary bracts narrowly triangular, attenuate, much shorter than the sterile bases of the elongate branches. FLORAL BRACTS ovate to narrowly triangular, longer or shorter than the 10 mm long pedicels; flowers lustrous red (! J. Betancur). SEPALS narrowly triangular, 32 mm long; petals 5 cm long; anthers and stigma exserted. Pl. 2.

84.1. ***Pitcairnia betancurii* L.B. Smith, sp. nov.** COLOMBIA. Antioquia: Municipio Medellín, Old road to Guarne, forest reserve of the Universidad Nacional, woods along the road, 6° 17' north latitude, 75° 30' west



Plate 1, *Pitcairnia arida* L.B. Smith & Betancur.



Plate 2, *Pitcairnia explosiva* L.B. Smith & Betancur.

longitude, 1900-2000 m alt., 23.V.1987, *Julio C. Betancur, T. Fonnegra, & palynology class 464* (HOLOTYPE: US; Isotype: HUA).

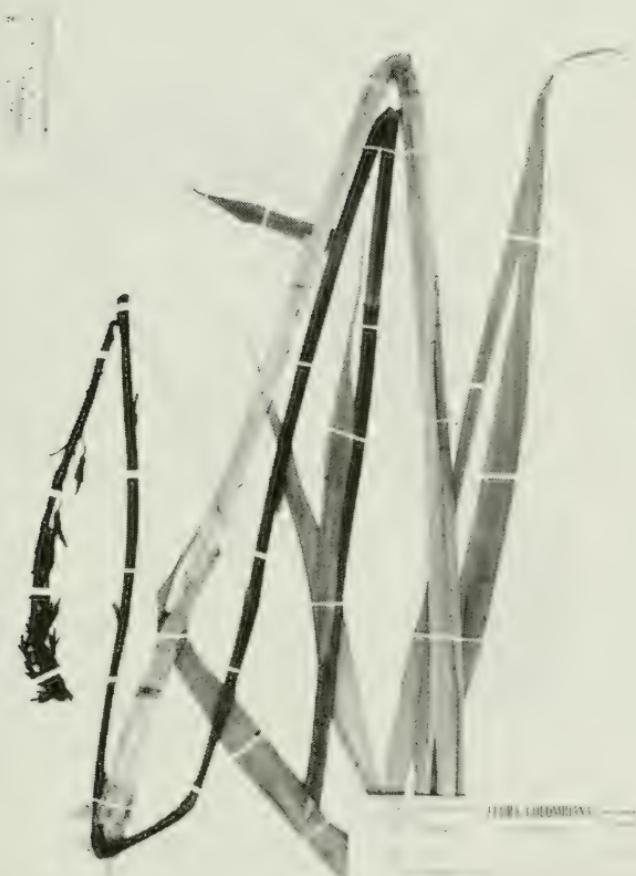
A *P. oranensis* L.B. Smith, cui verisimiliter affinis, foliis omnibus similibus, inflorescentia simplici pauciflora, pedicellis superioribus reflexis differt.

PLANT stemless (?), flowering 2.1 m high (! J. Betancur). LEAVES 1.65 m long (! J. Betancur), all alike, strongly nerved beneath; sheaths ovate, pale green and glabrous basally, apically castaneous and sparsely and obscurely lepidote, merging with the petiole; blade linear-lanceolate, attenuate, 3 cm wide, pale lepidote beneath, soon glabrous, entire, merging basally with the spinose-serrate petiole. SCAPE slender (apex 3 mm thick), white farinose, glabrescent; scape bracts foliaceous below, above ovate, apiculate, 15 mm long, remote. INFLORESCENCE 10 cm long, lax at base with ascending flowers, dense above with reflexed flowers, glabrous. FLORAL BRACTS ovate, acute, 2 mm long; pedicels slender, to 8 mm long. SEPALS oblong, broadly rounded, 7 mm long, ecarinate; petals yellow-green (! J. Betancur), 13 mm long; stamens and style included; ovary 2/3 superior. Pl. 3..

84.2. *Pitcairnia farinosa* L.B. Smith & J. Betancur, *sp. nov.* COLOMBIA.
Antioquia: Municipio Sonsón, Páramo de Las Palomas, paved road between La Palmita and Rioverde de los Montes, Cordillera Central, 3000 m alt., cloud forest, 5° 46.2' north latitude, 75° 14.58' west longitude, 8.IV.1988, *J. Betancur, R. Callejas, & J. Luteyn* 555 (HOLOTYPE: US; Isotype: HUA).

A *P. oranensis* L.B. Smith, cui verisimiliter affinis, foliis omnibus similibus, inflorescentia simplici densa, pedicellis patentibus differt.

PLANT stemless, known only from fragments but probably flowering near 2 m high. LEAF (one) 2.5 m long, strongly nerved beneath; sheath ovate, pale green and glabrous basally, apically castaneous and densely farinose and merging with the petiole; blade linear-lanceolate, attenuate, 4 cm wide, obscurely farinose both sides, glabrescent, entire, merging basally with the spinose-serrate petiole. SCAPE stout (apex 7 mm thick) dark red, white farinose (! J. Betancur), glabrescent; scape bracts ovate, ca. 7 mm long, remote. INFLORESCENCE simple, subdensely many flowered, 40 cm long, glabrous. FLORAL BRACTS ovate, 7 mm long; pedicels slender, spreading, to 13 mm long; flowers falling from the apex of the pedicel. SEPALS oblong-ovate, obtuse, 8 mm long, nerved; petals white (! J. Betancur), 35 mm long, naked; stamens and style included; ovary 3/4 superior. Pl. 4.



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Plate 3, *Pitcairnia betancurii* L.B. Smith



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Plate 4, *Pitcairnia farinosa* L.B. Smith & Betancur.

144.1. *Pitcairnia fluvialis* L.B. Smith & J. Betancur, sp. nov. COLOMBIA. Antioquia: Municipio San Luis, Saxicolous on the banks of the Río Samana Norte, canyon below the autohighway Medellín-Bogotá, under the bridge over the same river, 360 m alt., bmh-T, 5° 59' north latitude, 74° 56' west longitude, 23.VI.1987, *Julio C. Betancur, R. Callejas, A. Arbeláz, H. Correa* 469 (HOLOTYPE: US; Isotype: HUA).

A *P. johannis* L.B. Smith, cui verisimiliter affinis, bracteis florigeris late ovatis, pedicellis brevissimis, sepalis multo brevioribus base amplioribus differt.

PLANT caespitose (! J. Betancur), flowering 45 cm high. LEAVES all alike, fasciculate, 39 cm long; sheaths suborbicular, 17 mm long, apically castaneous and white lepidote; blades linear, long attenuate, 6 mm wide, glabrous with age, entire. SCAPE erect, slender, pale lepidote; scape bracts erect, the lowest subfoliaceous and imbricate, the highest ovate, acute, shorter than the internodes. INFRECTIONSCENCE sublax, 12 cm long, obscurely pale lepidote. FLORAL BRACTS like the upper scape bracts, 9 mm long; pedicels not over 2 mm long. SEPALS linear-lanceolate, acute, 17 mm long, the posterior ones carinate; ovary 4/5 superior; seeds bicaudate. Pl. 5.

164.1. *Pitcairnia setipetiola* L.B. Smith & J. Betancur, sp. nov. COLOMBIA. Antioquia: Municipio San Luis, Piedra del Castrillón, Cordillera Central, eastern slope, periodical cloud forest, borders and only on the steepest rockfaces, 1300-1700 m alt., 6° 4.30' north latitude, 74° 59.74' west longitude, 17.IX.1988, *J. Betancur, F.J. Roldán, G. Castaño* 714 (HOLOTYPE: US; Isotype: HUA).

A *P. semaphora* L.B. Smith, cui affinis, foliorum laminis petiolisque multo angustioribus, bracteis florigeris majoribus suberectis differt.

PLANT abundant (! J. Betancur), caulescent, flowering 54 cm high. LEAVES dimorphic, the outer reduced to ovate, 3 cm long, with floccose sheaths and linear flat setose-serrate blades; the inner foliaceous leaves fascicled below the inflorescence, 65 cm long; inner sheaths as before but inner ones to 12 cm long; blades lance-linear, attenuate, 23 mm wide, entire, narrowed into a rolled quill like petiole 1.5 mm thick, entire. SCAPE 1 mm thick, floccose; scape bracts ovate, apiculate, shorter than the upper internodes. INFLORESCENCE simple, 15 cm long, subdense, finely farinose except the petals. FLORAL BRACTS like the upper scape bracts, nearly equaling the sepals, rose (! J. Betancur). SEPALS lance-oblong, apiculate, 11 mm long, yellow-green (! J. Betancur); petals 17 mm long, white (! J. Betancur); ovary ca. 1/2 superior. Pl. 6.



Plate 5, *Pitcairnia fluvialis* L.B. Smith & Betancur.



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Plate 6, *Pitcairnia setipetiola* L.B. Smith & Betancur.

164.2. *Pitcairnia ventidirecta* L.B. Smith & J. Betancur, sp. nov. COLOMBIA. Antioquia: Municipio Sonsón, Páramo de Las Palomas, paved road between La Palmita and Rioverde de los Montes, Cordillera Central, cloud forest and bmh-M, 3000 m alt., 5° 46.2' north latitude, 75° 14.58' west longitude, 8.IV.1988, Julio Betancur, Ricardo Callejas, Jim Luteyn 552 (HOLOTYPE: US; Isotype: HUA).

A *P. semaphora* L.B. Smith, cui affinis, foliorum laminis petiolisque multo angustioribus, scapi vaginis supremis multo majoribus internodiis haud vel vix superantibus, bracteis florigeris amplis sepal a fere obtegentibus differt.

PLANT slenderly caulescent, flowering 54 cm high. LEAVES dimorphic, the outer reduced to ovate long floccose sheaths and linear flat 17 mm long black spinose-serrate blades; the inner foliaceous leaves fascicled below the inflorescence, 36 cm long; sheaths as before, blades lance-linear, attenuate, to 22 mm wide, entire, narrowed into a rolled quill like petiole 1.5 mm thick, spinose-serrulate. SCAPE ascending, slender, floccose at base; scape bracts like outer leaves basally, above elliptic, attenuate, exceeding or slightly shorter than the internodes. INFLORESCENCE simple, secund flowered, 13 cm long, lax at base, dense upward and sterile at apex, sparsely flocculose, glabrescent. FLORAL BRACTS ovate, apiculate, to 20 mm long, inflated, thin, the lower ones equaling and enfolding the sepals, the upper shorter; pedicels slender, 3 mm long. SEPALS lance-ovate, acute, 9 mm long, and corolla yellow (! J. Betancur) ovary 4/5 superior. Pl. 7.

169.1. *Pitcairnia gemmipara* L.B. Smith & J. Betancur, sp. nov. COLOMBIA. Antioquia: Municipio Frontino, Murri region, further below Alto de Cuevas, road from Nutivara to La Blanquita, 1680 m alt., bp-PM, 6° 4' north latitude, 76° 18' west longitude, 12.IV.1987, Julian C. Betancur, F.J. Roldán, D. Restrepo, G. Martínez, S. Silva, C.E. Orrego 419 (HOLOTYPE: US; Isotype: HUA).

A *P. sodiroi* Mez, cui in Flora Neotropica posita, planta cespitosa, foliorum laminis latissime oblanceolatis differt.

PLANT caespitose, flowering 180 cm high, producing shoots from the base. LEAVES fasciculate, to 92 cm long; sheaths ample, over 45 mm long, lustrous castaneous beneath; petioles slender, white lepidote beneath, densely serrate with slender spines 3 mm long; blade broadly oblanceolate, 13.5 cm wide, channeled, pale beneath with minute crossveins, dark above and white lepidote. SCAPE erect, ca. 10 mm thick, densely white lepidote; scape bracts narrowly triangular, long attenuate, much exceeding the internodes, spinose-serrulate. INFLORESCENCE simple, densely cylindric but the sepals largely



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COLLECTOR: W. Betancur & L. B. Smith
LOCALITY: Montaña de las Palmas, camino de
hacienda entre La Palma y El Verde de los Nogales.
1000 m.s.n.m., Cordillera Central, bosque nuboso.
Elev. 1750-1850 m. Alt. 14.58° Long. W; 3° 46.2° Lat. N.
y curva serrillos.

Municipio Sonson Páramo de las Palmas, camino de
hacienda entre La Palma y El Verde de los Nogales.
1000 m.s.n.m., Cordillera Central, bosque nuboso.
Elev. 1750-1850 m. Alt. 14.58° Long. W; 3° 46.2° Lat. N.

TYPE LOCALITY: Montaña de las Palmas, camino de
hacienda entre La Palma y El Verde de los Nogales.
1000 m.s.n.m., Cordillera Central, bosque nuboso.
Elev. 1750-1850 m. Alt. 14.58° Long. W; 3° 46.2° Lat. N.

Plate 7, *Pitcairnia ventidirecta* L.B. Smith & Betancur.

exposed, 63 cm long, white tomentose. FLORAL BRACKTS narrowly ovate, long attenuate, 3 cm long, thin, sulcate when dry; pedicels stout, 4 mm long; flowers suberect. SEPALS very narrowly triangular, attenuate, 32 mm long; petals 65 mm long, orange, bearing a truncate denticulate scale at base; stamens included; ovary 4/5 superior. Pl. 8.

169.2. *Pitcairnia fruticosa* L.B. Smith & J. Betancur, sp. nov. COLOMBIA. Antioquia: Municipio Frontino, Murri Region, road between Nutivara and La Blanquita, Alto de Cuevas, virgin forest slightly opened, bp-PM, 1910 m alt., 6° 47' north latitude, 76° 17' west longitude, 17.IV.1987, Julio C. Betancur, F.J. Roldán, D. Restrepo, G. Martínez, S. Sylva, C. E. Orrego 445 (HOLOTYPE: US; Isotype: HUA).

A *P. sodiroi* Mez, cui in Flora Neotropica posita, foliorum laminis latissime oblanceolatis, a *P. gemmipara* Smith & Betancur, planta epiphytica stolonifera differt.

PLANT epiphytic, stoloniferous, shrubby, flowering 130 cm high. LEAVES to 90 cm long; sheaths ample, ca. 60 cm wide, castaneous beneath; petioles slender, pale and sulcate (dry) beneath, laxly serrate with straight spreading 2.5 mm long black spines; blade broadly oblanceolate, acute, 11 cm wide, pale beneath with minute crossveins, dark above and sparsely pale lepidote. SCAPE erect, 1 cm thick, densely white lepidote; scape bracts ovate, attenuate, appressed pale lepidote, spinose-serrate, much exceeding the internodes. INFLORESCENCE simple, subdensely cylindric, 44 cm long. FLORAL BRACKTS narrowly triangular from an ovate base, attenuate, shorter than the upper sepals, papryaceous; pedicels stout, 2 mm long; flowers divergent. SEPALS narrowly ovate, apiculate, 38 mm long, glabrous, yellow-green; petals 6 cm long, orange; stamens and pistil included. Pl. 9.

176.1. *Pitcairnia formosa* L.B. Smith & J. Betancur, sp. nov. COLOMBIA. Antioquia: Municipio de Salgar, 5 km on the road from Bolombolo to Salgar, bs-T, border herb very showy and abundant with almost all individuals in flower, 720 m alt., 5° 55' north latitude, 75° 55' west longitude, 29.IX.1987, Julio C. Betancur, Jim Zaruchi, & Alan Brant 513 (HOLOTYPE: US; Isotype: HUA).

A *P. brachysperma* André, cui valde affinis, sepalis latioribus late alatis differt.

PLANT known only from fragments, flowering over 67 cm high. LEAVES (only foliaceous known) to 113 cm long; covered beneath with a membrane of fused scales ("white-furfuraceus" Mez), ("cerosided" Betancur); sheaths unknown; blades linear-lanceolate, 2 cm wide, entire; petioles distinct, 1 cm



Plate 8, *Pitcairnia gemmipara* L.B. Smith & Betancur.



Plate 9, *Pitcairnia fruticosa* L.B. Smith & Betancur.



Plate 10, *Pitcairnia formosa* L.B. Smith & Betancur.



Plate 11, *Pitcairnia basincurva* L.B. Smith & Betancur.

wide. SCAPE erect, slender, glabrescent; scape bracts narrowly ovate, attenuate, white vestite with fused scales, only the highest shorter than the internodes. INFLORESCENCE simple, lax, 16 cm long. FLORAL BRACTS ovate, attenuate, exceeding the pedicels, papyraceous, green (! J. Betancur), white vestite with fused scales; pedicels to 12 mm long, angled, more or less vestite. SEPALS lance-oblong, attenuate, 33 mm long, coffee red, the dorsal ones broadly alate; petals ca. 5 cm long, red-orange (! J. Betancur); stamens and stigma enclosed, ovary 4/5 superior. Pl. 10.

216.2. *Pitcairnia basincurva* L.B. Smith & J. Betancur, sp. nov. COLOMBIA. Antioquia: Municipio Santo Domingo: 20 km on the road from Barbosa to Yolombó, after El Pescadito Restaurant, abundant on the roadside bank, 1100 m alt., 6° 31' north latitude, 75° 14' west longitude, 19.IX.1987, *Julio C. Betancur, R. Callejas, F.J. Roldán* 512 (HOLOTYPE: US; Isotype: HUA).

A *P. abundans* L.B. Smith, cui verisimiliter affinis, scapi bracteis parvis remotis, bracteis florigeris quam pedicellis gracilibus brevioribus differt.

PLANT stemless, flowering 9 dm high. LEAVES polymorphic, the outermost with suborbicular sheaths and flat linear spinose-serrate 25 mm long persistent blades, next above leaves known only by their incurved entire 15 mm wide stubs, and centrally an ovate apiculate sheath developing into foliaceous linear-lanceolate subpetiolate entire blades 56 cm long, 20 mm wide, laxly and finely pale lepidote on both sides. SCAPE straight, slender, sparsely and finely pale lepidote; scape bracts narrowly triangular, attenuate, thin, much shorter than the internodes. INFLORESCENCE simple, laxly racemose, 26 cm long, laxly and finely pale lepidote including the petals. FLORAL BRACTS like the upper scape bracts, about equaling the slender 12 mm long pedicels. SEPALS linear-lanceolate, acute, 29 mm long, strongly asymmetric, basally red, apically yellow; petals white (! J. Betancur), naked, zygomorphic forming a hood over the stamens and stigma; ovary less than half superior. Pl. 11.

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